ROSE'S
PUBLIC SCHOOL GEOGRAPHY

Rose's Public School Geography

THE EARTH

ITS FAMILIAR OBJECTS

WITH NUMEROUS MAPS AND DIAGRAMS ILLUSTRATING THE TEXT, TOGETHER WITH MANY ILLUSTRATIONS TAKEN FROM PHOTOGRAPHS OF ACTUAL SCENES

PRICE, 40 CENTS

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CONTENTS

INTRODUCTORY

This book is intended as a Reader in Geography for the use of younger pupils in our public schools.

In its preparation two objects have been kept steadily in view—to encourage a habit of close observation of commonplace facts and everyday occurrences, and to create a lively interest from the very beginning in a subject that is often considered dry and tedious.

The teacher can greatly aid in furthering these two objects by directing the pupils in further nature study, relating incidents obtained from his own experience or from books of travel and adventure, providing for the collection of specimens of various kinds to form a small museum, using pictures which both teacher and pupils may procure, making black-board sketches to illustrate as many points as possible, and by many other devices that may suggest themselves.

The order of topics in the book may be changed where the teacher prefers. This is especially necessary in the case of experiments which will extend over a considerable period of time, such as weather observations and the study of shadows cast by the sun.

The questions at the ends of the chapters are intended as samples of what may be asked, and do not cover all the work to be taken up. The teacher is recommended to add many others to each list, and to present those

suitable for the purpose to the student *before* the study of the chapter to which the questions belong.

The work has been written expressly for Canadian schools, and where possible the references throughout the text are to Canadian examples. The illustrations, which have been chosen for their teaching and illustrative value, have been made chiefly from photographs of scenes in the various provinces, and it is hoped they will be studied equally with the text. The thanks of the author and publishers are due to J. Dearness, Esq., M.A., Vice-Principal of the London Normal School; Prof. A. P. Coleman, Ph. D., of the School of Practical Science, Toronto; C. C. James, Esq., M.A., Deputy Minister of Agriculture and Secretary of the Bureau of Industries, Toronto; and James Bain, Esq., D.C.L., Public Librarian, Toronto, for valuable advice.

In Part II, which follows, the Earth as a whole, the Continents, and the various countries will be dealt with.

PUBLIC SCHOOL GEOGRAPHY

PART I

IN THE COUNTRY

Who is not fond of a ramble in the country? The city boy or girl is glad to get away from noise, dust, and smoke, to breathe the pure country air, to enjoy the perfume of the wild flowers, and to hear the singing of the birds and the rippling of the waters of the streamlet. The country boy knows the best places in the ponds or creeks for boating, bathing, and catching fine fish, and the best

FIG. 1—A Country Scene near Wetaskiwin, Alberta. Observe and name the principal points or objects of interest

woods in which to gather beech-nuts and hunt black squirrels. The country girl knows where to find wild lilies and violets, daisies and buttercups, strawberries and may-apples. Which do you think is the more pleasant time of the year in the country—the spring, with opening leaves and budding flowers; or the autumn, with grain and fruits, and varied, charming tints of forest foliage?

FIG. 2—A Hill, showing Base, Summit, Slope, and Valley. What else do you see?

Sometimes the country is nearly level for several miles in all directions. It is then a large *plain*. If we examine it very closely we shall find that it is not perfectly level. The stream which crosses it contains running water, and water always runs down hill. So we say, the land *slopes* very gently in the direction in which the water is running. In some places, however, the land is so nearly level that

it is very difficult to drain it. People do not dig cellars under their houses, but use instead small darkened buildings near their kitchen doors. Why should they like buildings better than cellars? Why do they keep the light out of the buildings?

Other parts of the country are not level. We walk along the road and very soon come to a *hill* (Fig. 2) over which we must go. The lower part of the hill is known as its *base;* the side up or down which we walk, the *slope;* and the top the *summit* or *crest.* From the summit of a hill we often obtain a delightful view of the surrounding country, with many other hills, farmhouses, and even villages or towns. The low parts between the hills are called *valleys.* In poetry a valley is often called a *vale,* a *dell,* a *dale,* or a *dingle.* What is the difference between a valley and a plain?

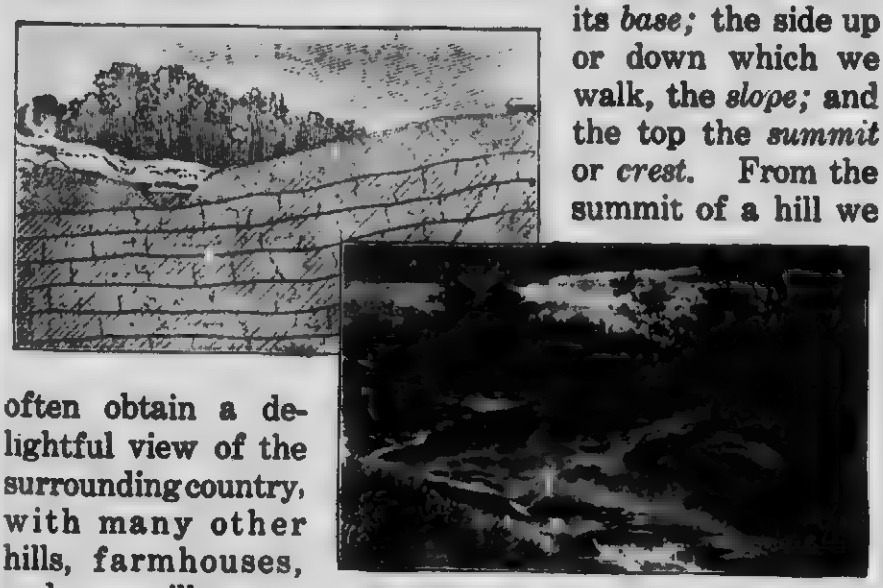


FIG. 3 - How a Spring is Formed. Source of a Stream

Describe the surface of the land near your home. In what direction does it slope? Are there any plains, hills, streams or valleys in it? Are the valleys long or short? Do streams of water flow down any of the valleys?

In our walk we come to a sparkling little stream winding through the meadow and rippling under the wooden bridge on the road.

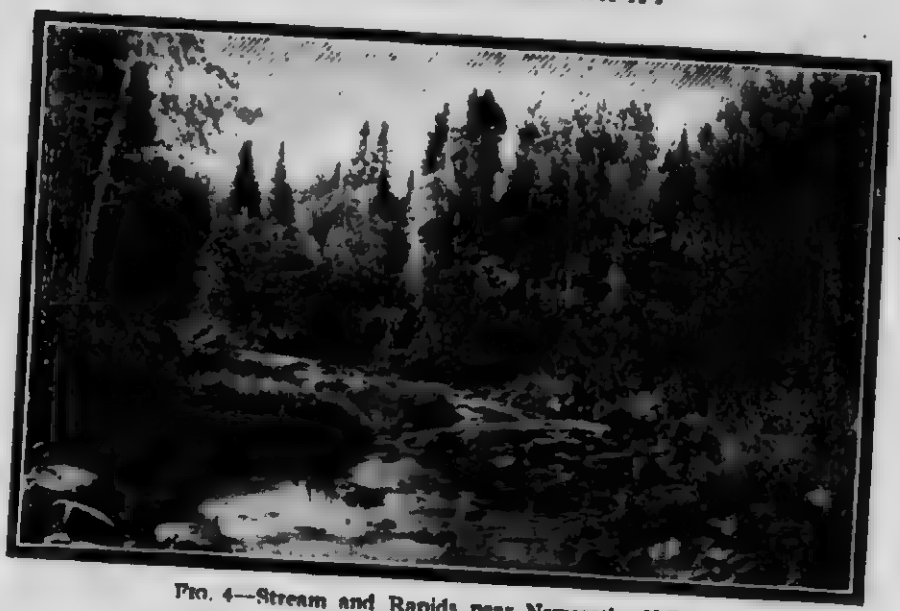


FIG. 4—Stream and Rapids near Newcastle, N.B.

Where does the water come from? To find this out we must trace the course of the stream up through the meadows and among the hills. It becomes smaller as we go on, and soon we find its starting place or *source* (Fig. 3). The ground is quite wet with water which seems to come from the ground. Sometimes the people sink a barrel there, and lead a small trough to it from the bank; through this trough the water runs into the barrel. There are several hills near by, and the rain falling on the slopes slowly strains or filters down through the ground, trickles out clear and cold into the barrel, and overflows the edge of the barrel to form the little *rill* or *brook*. The place where water comes out of the ground in this way is called a *spring*. As the brook flows down through the valley it is joined by many others from the hillsides, and it begins to enlarge. All these little streams are much larger and dirtier in rainy weather than in dry weather. Can you tell why? Why is the spring water clear? Why is it cold?

To find where the waters go, we must follow the brook down a long distance from the bridge. Here is a place where it is quite deep, and its *current*, or onward motion, is slow and quiet. Farther down it is shallow, and the bottom slopes more rapidly down the hillside, and is quite stony; the current too is very swift and rough. This latter place is a *rapid* (Fig. 4). A short distance below the rapid the waters flow into a larger stream, known as a *creek*. The creek flows down its valley till it broadens out into the *pond* at the grist mill (Fig. 5). Many years ago the miller built a great bank of earth and stones across the creek, and formed the pond, so as to get a strong and steady pressure of water to run the machinery of his mill. The bottom of the pond is quite muddy, and near the shore grasses, rushes, and beautiful water lilies are growing up through the water. What a fine place this is for the frogs and muskrats! In the summer, boys make rafts and paddle about on it, and in the winter it becomes frozen

FIG 5—Old Grist Mill and Pond

over, and boys and girls have great fun skating, sliding, and sleigh-riding upon the ice. The creek passes on from the pond to join the *river*, and the river flows into the large *lake* (Fig. 6).

If we should examine the upper course of the creek we should find that it had received many small brooks such as the one just described, and farther up it was a small brook itself. The rills and creeks are said to *drain* the whole

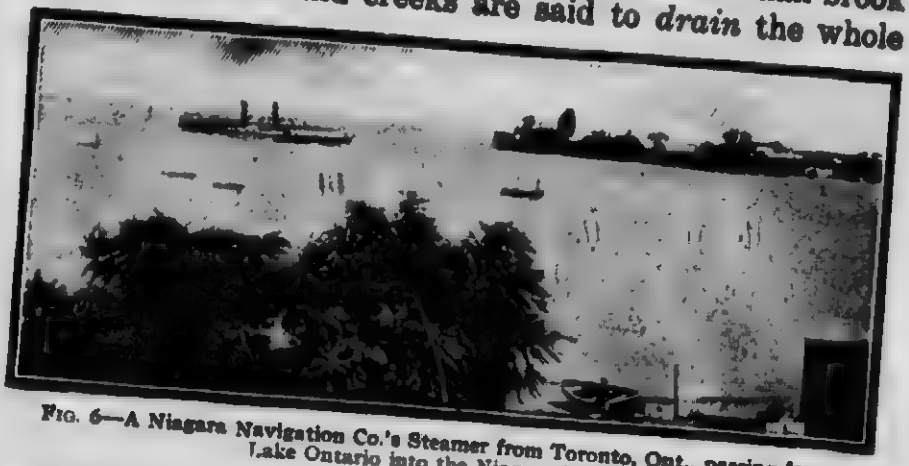


FIG. 6—A Niagara Navigation Co.'s Steamer from Toronto, Ont., passing from Lake Ontario into the Niagara River

country through which they flow, that is, they carry away the water that falls as rain upon it. The district drained is called the *basin*. Between two brooks the land is high, and the rain falling upon one slope of the ridge makes its way to one brook, and upon the other slope to the other brook. The ridge divides the rainfall, and it is therefore called a *divide* or *watershed* (Fig. 7). Each brook received by the creek is called a *tributary*.

Describe a stream near your home. Can you tell where its source is? Where is its current swift and where slow? Has it any rapids? Does it enlarge anywhere into a pond? Has it any tributaries? Into what do its waters flow? Where is the watershed that forms its basin?

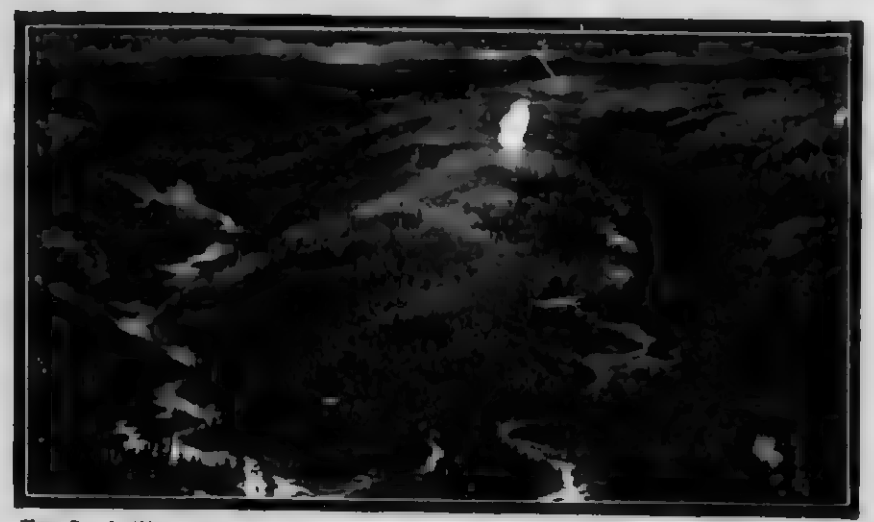


FIG. 7—A Watershed, or Divide, showing the different directions in which the waters are divided

If you have a heap of sand, at your school or at your home, in which you can play, mould in it hills and valleys similar to those near which you live, or like any of the pictures in this book. Creeks and ponds may be shown by means of white paper or cardboard cut into proper shape, or by carefully sprinkling a little flour along their courses.

If there be a moulding board in your school, you may model these forms of land and water on it, under the direction of your teacher.

QUESTIONS

1. Describe in your own words what is meant by each term printed in Italics in this chapter.

Do the same with words in Italics in each of the other chapters in this book.

2. What is the difference between a spring and a well?

3. At what time of the year have brooks the least water? Why?

4. Have you ever known any brooks to become dry? If so, when?

5. Many streams continue to flow in dry weather. From where does their water come?

6. Why do streams differ in size and in swiftness of current?

MOUNTAINS

Mountains are very large hills. Some of their summits are pointed and high above the clouds (Fig. 8); others are lower, rounded, and covered with forest. Often their sides are so rough and steep that it is very difficult and in some places impossible to climb them, but sometimes the sides are gently sloping and smooth. There is very little level land upon any of them.

At the base of a mountain fields of waving grain and orchards with their trees heavily laden with fruit show that the land there is fertile and well cultivated. Farther up the slope the ground becomes stony, and the stones are

FIG. 8—The Three Sisters, Canmore, Alberta, part of the high Rocky Mountain Ranges

Fig. 9—Illecillewaet Valley, B.C. Observe the snow line, timber line, mountain streams, glaciers, etc.

often so large that the name *rocks* is given to them. There, farming cannot be carried on, but flocks of sheep find a good grazing ground and yield their owners a fine crop of wool. The creek comes dashing down the mountain side, forming small *waterfalls* by tumbling over rocky ledges. Do you think there could be waterfalls if there were no mountains or hills? Higher up the mountain maple and beech trees are no longer found, but pines and spruces grow in the thin earth which covers the rocks. Men are busy cutting down the trees in order to saw them into lumber or grind them into pulp out of which to make paper. Others are working in *mines* in the side of the mountain, taking out the rich *ore* or rock from which gold, iron, or other minerals can be obtained.

The farther one goes up a mountain side the colder is the air. A line is reached, known as the *timber line*, above

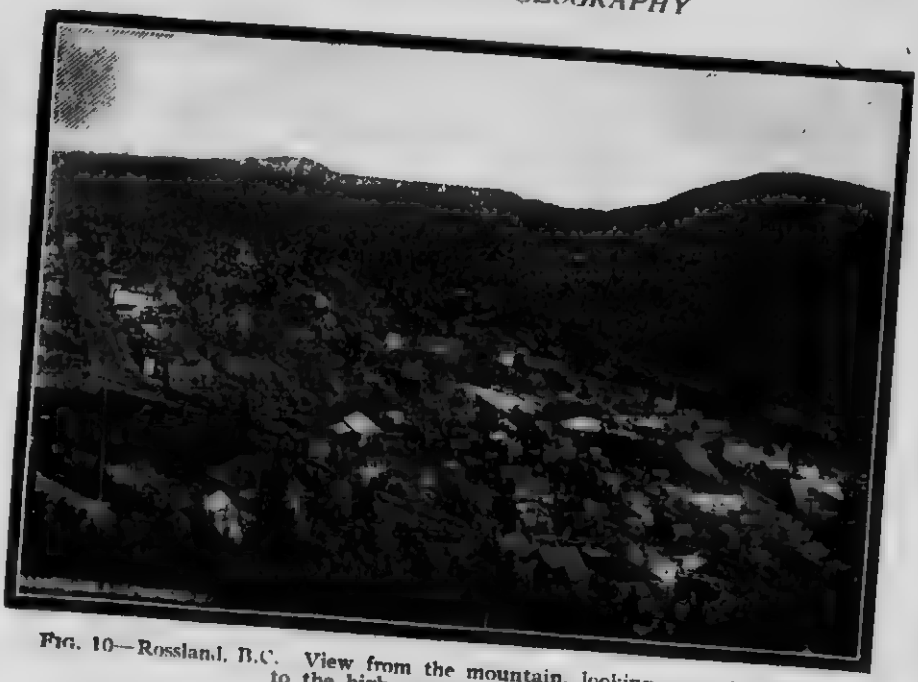


FIG. 10—Rossland, B.C. View from the mountain, looking over the valley to the high mountains beyond

which there are no trees, but only grasses and small plants grow. Still higher up, the latter also disappear because the air is too cold for them, even in the middle of summer, and the whole mountain summit is covered with snow and ice all the year round. The line above which the snow never entirely melts is called the *snow line* (Fig. 9). Under the influence of the summer sun, the ice and snow slowly melt, and the rills and creeks which flow from their lower edges join to form the river farther down the slope. Some of the snow becomes packed into great beds of ice, called *glaciers*, which very slowly slide, like large white rivers, down the mountain side, and as they melt form the sources of rivers. Frequently an *avalanche* occurs—a great mass of snow and ice becomes loose and crashes down into the valley, like a snow-slide off the roof of a building, and destroys trees, houses, and farm crops.

The view from the summit of a high mountain is very grand (Fig. 10). Many other mountains are seen, for mountains are scarcely ever found singly. Rivers and creeks wind their way through the valleys, like shining ribbons, here and there broadening into lakes. In the distance wide plains are sometimes seen, dotted with villages and towns.

Mountains may be regarded as hills grown large. Many of them are not done growing or swelling yet, but their growth is so slow that even in a man's lifetime very little difference can be noticed. Ages and ages ago they began as small hills, and they have gradually risen into great wrinkles extending in some places for hundreds and even thousands of miles. Each wrinkle is called a *range* or *ridge*, and is made up of many mountains so close together that their slopes form only two sides, like the roof of a house. The separate mountain tops in a range are called *peaks* (Fig. 8), and the valleys between the peaks are called *passes*. Often several ranges are close together, forming over the country a great mass of wrinkles known as a mountain *system*. When a high piece of country extends many miles in all directions it is called a *plateau*. Sometimes a plateau is more or less level, and at other times mountain ranges or systems rise from it.

Although mountains are growing larger in the way just described, they are also slowly becoming smaller. Have you ever noticed how rains dig deep furrows in the side of a bank or along the roadside down a hill? (Fig. 11). Hills in the same way are being slowly worn down, and so also are mountains. Rains fall upon the mountain slopes and carry earth from them to the valleys below. As the rocks become bare they slowly decay, and they also are washed down. Do you not think that in time, if it be long enough, all the mountains will become level?

Not all mountain peaks have been formed by the wrinkling of the land. Deep down in the ground there is very great heat—enough to melt even stones and rocks. Did you ever see melted iron as it runs white and hot from the furnace in a foundry? Melted stone resembles this very much, and is called *lava*. When lava has cooled, it looks somewhat like the clinkers which you sometimes

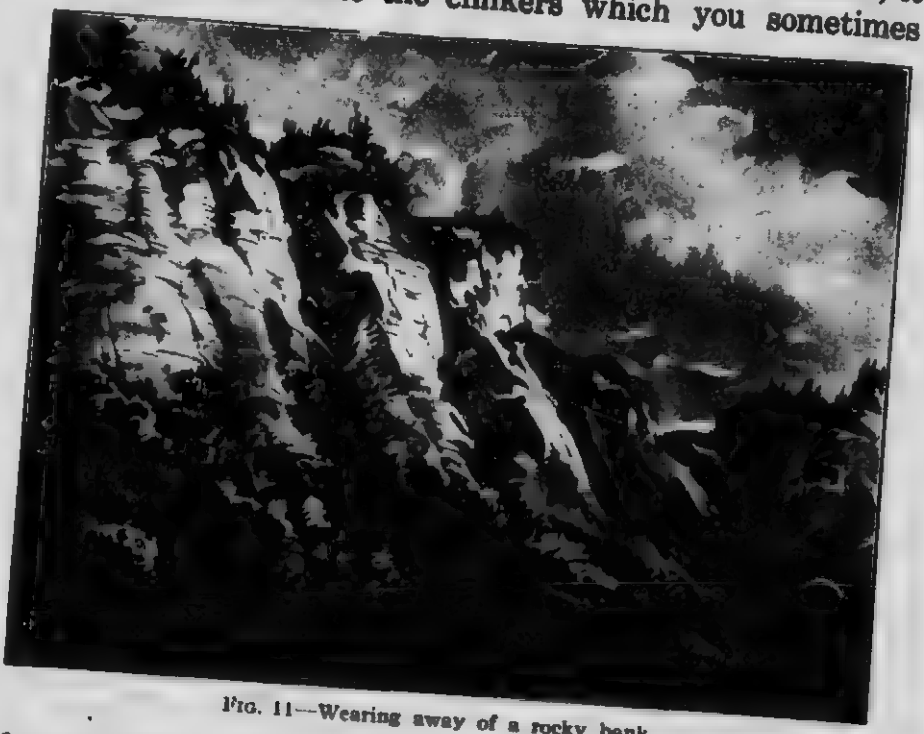


FIG. 11—Wearing away of a rocky bank

find in your coal stove. Sometimes water trickles down amongst hot melted stone, steam is formed, and then, if the ground is not strong enough to prevent it, there is a terrible explosion, a great hole is burst open, steam and dust are blown out, and red-hot lava is driven out over the sides of the opening. If this eruption continue for many years the material thrown out builds up a high mountain, known as a *volcano*, the cavity at the summit, out of which

FIG. 12—Crater of Mt. Vesuvius

the material is thrown, being called the *crater* (Fig. 12). Volcanoes are usually found in mountainous regions, because there the wrinkled ground i weaker than on the plains. They are sometimes very destructive. Long ago, in a distant country called Italy, two cities and some villages were buried in the ashes and lava from a volcano called Mount Vesuvius (Fig. 12), and the people in them perished. The cities were forgotten until, many hundred years afterwards, they were accidentally found by some men who were digging a well, and then they were excavated and many interesting things were found in them. We occasionally hear of other terrible disasters from volcanic eruptions in different parts of the world.

Countries in volcanic regions are often visited by *earthquakes*. For several minutes, during the most severe shocks, the ground trembles so violently as to overturn strong buildings, and in some cases to destroy cities and cause great loss of life.

QUESTIONS

1. Often it snows on elevated land when it rains on the low land. Why is this?
2. Where is it cooler in the sunshine on a summer afternoon, on a hilltop or in a valley?
3. What are the chief occupations of people in the mountains? In the valleys?
4. What are some of the useful articles men obtain in the mountains?
5. How does a mountain differ from a hill?
6. State two ways in which mountain peaks have been formed.
7. From what causes are mountains growing smaller?
8. Where would you rather live, on a mountain or in a valley? Why?

A SAIL DOWN THE RIVER

We have already learned that rills join to form creeks. In the same way creeks join to form *rivers*, and rivers flow into other rivers and lakes, or the vast body of water called the *ocean*.

Let us take a journey by boat *down* a river, that is, in the same direction as that in which the water is flowing. The opposite direction is *up*. Why are these two names suitable for these directions?

The land on both sides of the river is called the *banks*, that on our right hand, as we go down, being the *right* bank, and on our left the *left* bank. The ground over which the water flows is the *bed* or *channel*. As this river

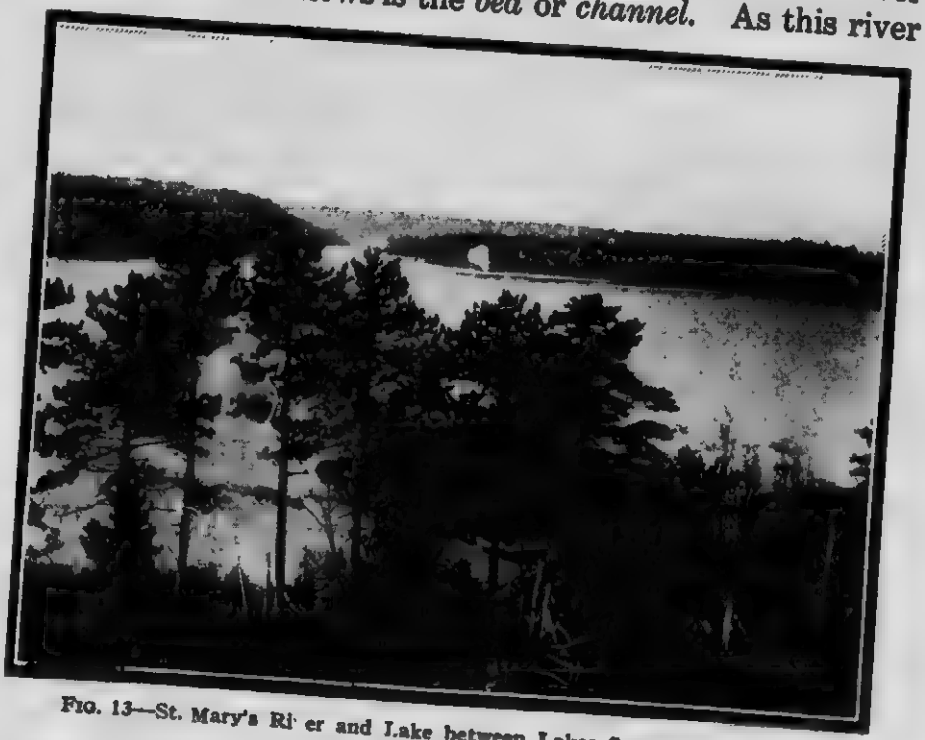


FIG. 13—St. Mary's River and Lake between Lakes Superior and Huron

is not obstructed by rapids or waterfalls, and is deep enough to allow a boat to travel upon it, it is said to be *navigable.*

In a previous lesson you explained why brooks and creeks are dirtier in rainy than in dry weather. Where do the rains wear away the land more rapidly; where it is covered with trees and grass; or where it is ploughed? We notice as we sail along that the banks are in some places very high, and that the river is flowing between hills. The valleys have been made by the river and its tributaries. As rain fell pon the soft earth it formed rills which soon wore deep passages down the slopes, and carried away the sand and clay into the muddy waters (Fig. 11). Just over there to our right a tree has fallen because the water has worn the ground away from around its roots. The streams have been flowing for many

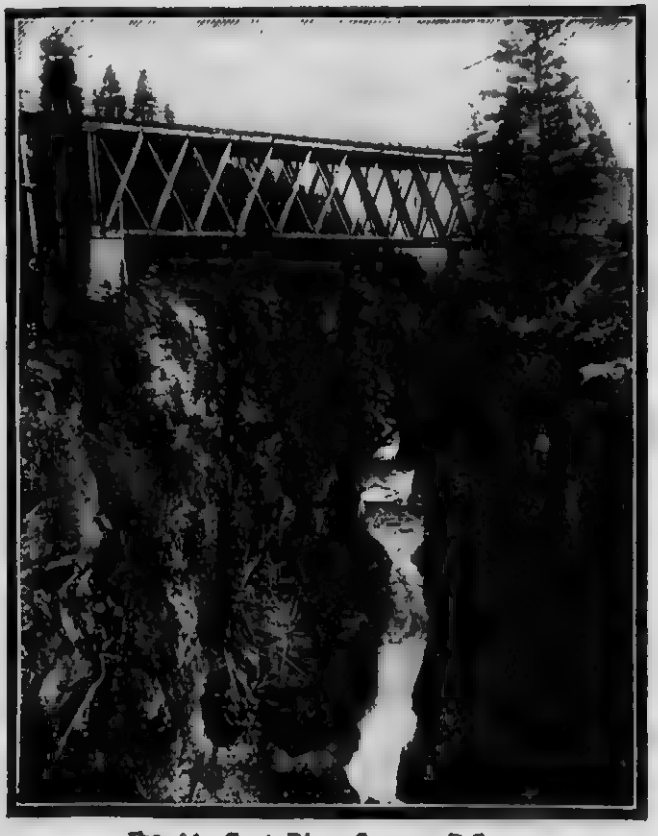


FIG. 14—Goat River Canyon, B.C.

thousands of years, and have worn deep valleys, and left high hills along both sides of the river. All rivers are, in a similar manner, wearing away their bed and their banks. Some have formed deep *ravines* or *gorges*, whose steep slopes look like the sides of high mountains (Fig. 14). The name *canyon* is sometimes given to a long deep ravine with walls nearly straight up and down, cut by a river.

Soon we come to a place where the river broadens out several miles in width (Fig. 13), and the waters seem to have no current. We have entered a *lake*. A sail of a couple of hours brings us to where the river leaves it at the other end. We shall return and visit this lake, and the account of our visit will be the subject of the next chapter.

We pass on down between the hills, and after a short time come to where the country is nearly level for miles on both sides of the river. The stream flows very slowly, and winds back and forth, so that its course over this plain is very long. What do you think becomes of the dirt which brooks and creeks collect during rain-storms? Every spring the heavy rains and the melting snow on the hills cause great *freshets*. The river swells so as to nearly fill its channel, and the bordering country seems in danger of being overflowed with water. Hundreds of years ago the river did overflow its banks and submerge the whole district. Every time this occurred a layer of mud, called *silt*, which the waters had carried down with them from the hills was deposited over the land, and left there when they flowed away. In this way a great *flood plain* (Fig. 15), has been formed, which has become so high that the waters do not now cover it. The land over this plain is very fertile, and the whole district is well settled by thrifty farmers who have a market for their produce in the town which we are approaching.

Along the banks we see men and boys fishing with rod and line for the excellent fish to be caught in this river. Then we meet an excursion steamer heavily laden with people going up the river to spend the day at one of the delightful summer resorts.

Our stay at the town is not long. The boat is brought to the *wharf* or *dock*, a platform along the bank, where it is

FIG. 15—Valley of the Restigouche, New Brunswick. Note the flood plain between the hills

moored, or tied, for a little while. Some passengers leave the boat, others come on, and many boxes and barrels of goods are taken on board to be carried to the city at the end of our trip.

A few hours' further sailing brings us near the *mouth* of the river, that is, where the river empties into the lake or sea. A large river often forms a *delta*, or flood

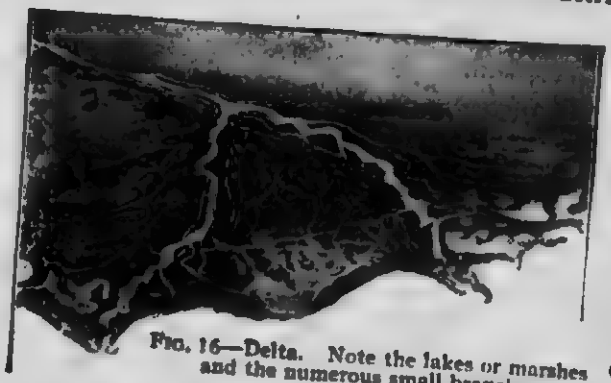


FIG. 16—Delta. Note the lakes or marshes and the numerous small branches

plain at the sea-shore (Fig. 16). A delta is usually fan-shaped, the shore of the sea or ocean forming one side, and large branches of the river the others, while many small streams flow in irregular directions over it.

A city has grown up at the mouth of the river (Fig. 17). There are many wharves where vessels may be moored and receive or discharge their cargo. A city on the sea-shore or a lake shore where vessels may receive or unload

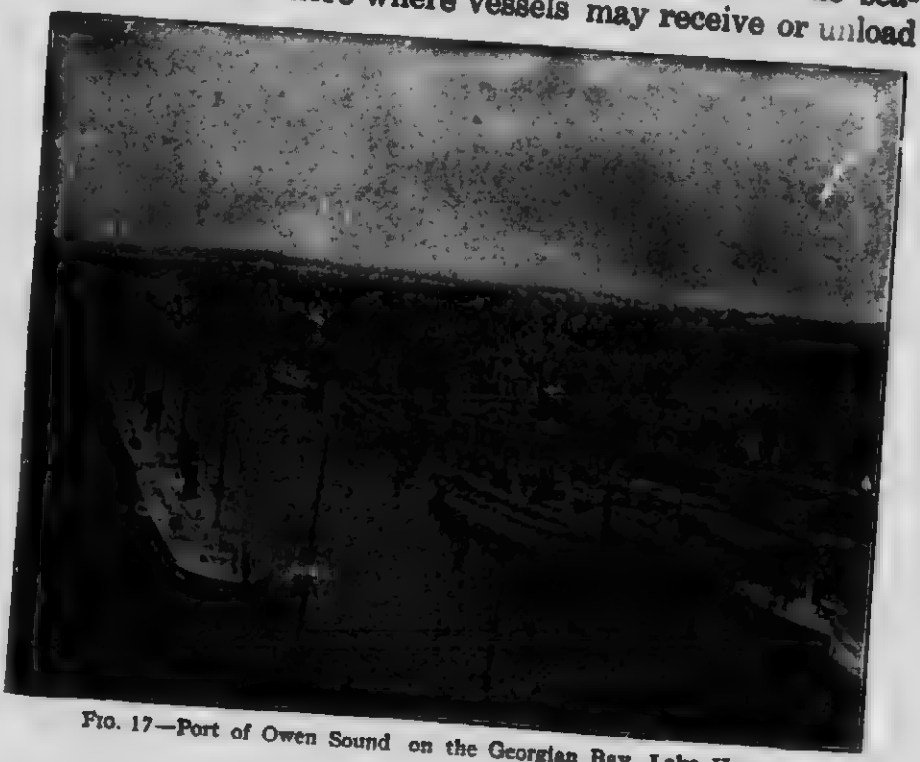


FIG. 17—Port of Owen Sound on the Georgian Bay, Lake Huron

a cargo is called a *port*.

A river with all its tributaries, and the hundreds of creeks and rills that drain into it, is a river *system* (Fig. 18). Some river basins are very large, extending for many hundred miles, and sometimes even thousands of miles, in different directions.

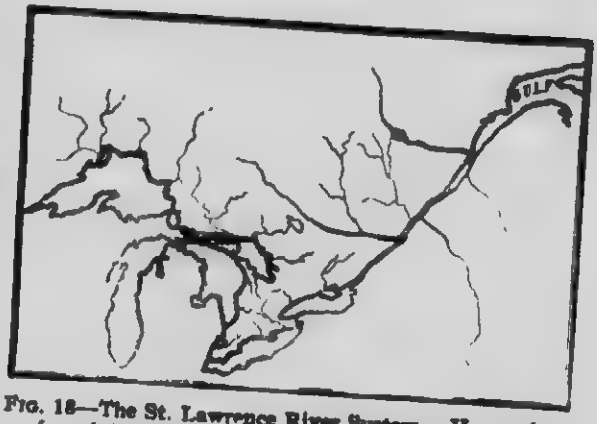


FIG. 18—The St. Lawrence River System. Here only a few of the tributaries are shown. This system extends more than two thousand miles in length, and comprises an immense number of tributaries large and small.

QUESTIONS

1. How does a river differ from a creek?
2. In what season of the year are the waters of a stream the clearest? Why?
3. What are sandbars? Why does the river drop the sand there which forms them?
4. Why are some creeks and rivers very crooked? Where do they wind more, among hills or over a plain?
5. What reasons are there for believing that many valleys have been made by creeks and rivers? Can you find any such valleys near your home?
6. Where does water flow faster, among hills, or over level country?
7. How does water drive a grist-mill or a saw-mill?
8. When does a river do most work, in dry weather or wet weather, when its current is swift or slow, when it flows over a hilly or over a level country?
9. What harmful kinds of work may water do?
10. State as many uses of rivers as you can.
11. What kind of river is best for each of the uses you mention?
12. In what way are waterfalls useful?

A VISIT TO THE LAKE

As mountains are large hills, and rivers large creeks, so lakes are large ponds. In Canada there are some lakes so large that a person cannot see across them, and a rapid passenger boat requires more than a day of twenty-four hours to travel from one end to the other.

The lake which we are now to visit, is delightfully situated among the hills (Fig. 19). Long ago the river wound its course down the slope, and at this place found a large depression in the land into which its waters flowed. They could not get out until they had filled the whole cavity; then they overflowed the border at its lowest point. In this way the lake was formed. Several streams flow into the lake, but only one flows out. The main stream flowing into it—the one by which we entered the lake—is the *inlet*, and the one flowing out, the *outlet*. The part of the lake next to the

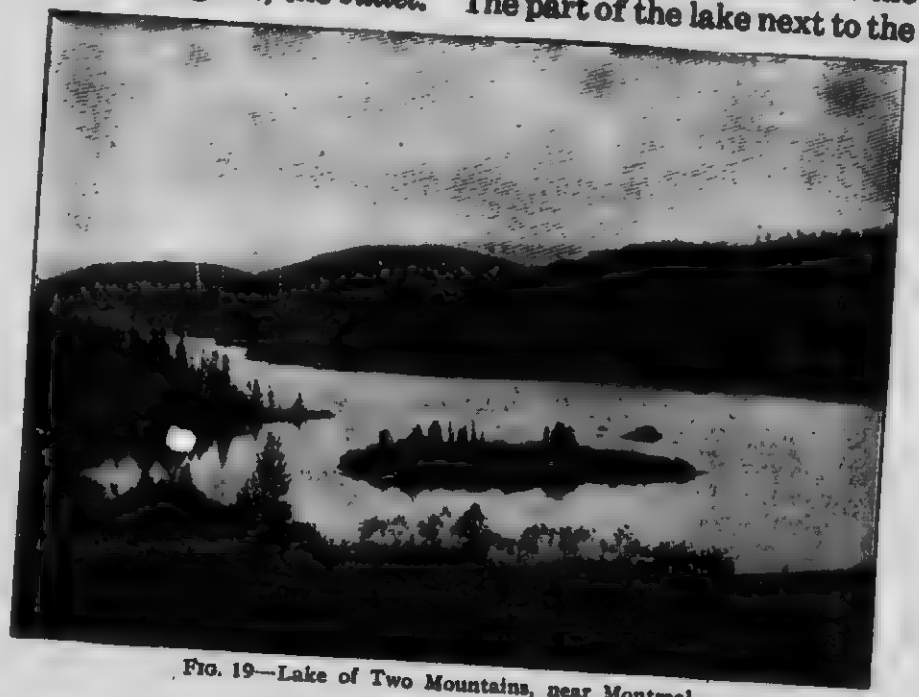


FIG. 19—Lake of Two Mountains, near Montreal

inlet is the *head*, and the part where the outlet leaves it the *foot*. The land bordering the lake on all sides is the *shore*.

The pond which we saw in our visit to the country was formed because the miller had built a dam across the valley of the creek. The dams which cause lakes to form are generally natural ones—not made by man. Sometimes the course of a river becomes blocked by the slow upheaval of the land (similar to that seen in the growth of mountains), by a landslide, by a sandbar formed by the river itself, or by the action of avalanches, glaciers, or volcanoes. The depression soon becomes filled with the incoming water, and the result is a lake.

The shore of the lake we are visiting is not even, but curves in and out in a curious manner. This is because there are so many hills and valleys along the shore, and the lower parts of the valleys become, of course, partly filled with water. At one place we find a ridge of land extending quite a distance into the lake. This we call a *cape* or *point*. At another place the shore curves inwards, forming a quiet and secluded piece of water known as a *bay*.

The shore of this bay is flat and sandy, so that it is a splendid place for digging in the sand or "paddling" in the water. How smooth the pebbles are, and how beautifully they are colored! They have been worn down like this by the action of the waves rubbing them against one another. We may gather some of the prettiest of them and take them home with us. Near this *beach* there are many summer cottages, which are brightly painted and gay with Union Jacks. People from the towns and cities come here every summer, live in the cottages, go bathing, fishing, or boating on the lake, and have an outing that is pleasant and healthful.

A short distance from the shore there are several *islands*, or bodies of land of different sizes and shapes, around which the cottagers may row in their boats. The narrow

passages of water which separate the islands from one another and from the shore are called *straits*. Sometimes a strait is long and wide, and it receives the name *channel* —you must remember, however, that this is not the same as the channel of a river.

Not very far away from the islands is a body of land which looks very much like an island, but is not one because it is joined to the shore or *mainland* by a narrow neck of land. It is called a *peninsula*, and the narrow piece of land joining it with the shore an *isthmus*.

Large lakes are often visited by storms. The wind blows very fiercely, and the waves beat high. Then it is that boats are in danger of being wrecked, and their sailors try to get them into one of the small bays along the shore. A bay that can thus give shelter to vessels during a storm is a *harbor* (Fig. 17).

It is not likely that this lake will last forever. We can see several signs that it is being slowly destroyed. The inlet and other streams are carrying into it large quantities of silt, and this sinks in the quiet waters and is gradually filling it up. The outlet is also constantly wearing down its channel, and, no doubt, will drain more water out of the lake in years to come than now. Then, on the side of the lake opposite the summer cottages there is a bay with low shores, and full of weeds, grasses, and broken trunks and branches of trees. The air is alive with mosquitoes, frogs in hundreds are trilling their own kind of music and black-snakes are common in the darker and more hidden parts. A place of this kind is a *swamp* (Fig. 20). There the weeds are slowly spreading over the shallow waters of the lake and helping to hold the dead leaves and loose earth carried down in every rain storm. In course of time the swamp will become solid land, and the lake will therefore be smaller.

Perhaps you can get a piece of ground near your home where you can mould a large river basin, with river

FIG. 20—A Swamp. What objects do you see that are generally to be found in swamps?

channel, tributaries, lake cavity, and the surrounding hills. Then sprinkle water from a watering can upon the higher part of what you have moulded, and watch the course of the rills, creeks, and rivers, and the formation of the lake. The lake cavity may be so made that capes, bays, islands, and other forms of land and water we have mentioned will be formed when it is filled with the water.

If possible, examine a ditch by the roadside immediately after a heavy rain, and try to find in it rapids, a waterfall, a canyon, a lake, islands, and other features you have been studying.

Mould a river system on the moulding board; also a lake shore, showing as many forms of land and water as you can.

QUESTIONS

1. How does a lake differ from a pond?
2. How may lakes be formed?
3. In what ways are lakes useful?
4. Where are swamps usually formed?
5. State three causes that tend to destroy lakes.

Fig. 21—Harbor Front at St. John, N.B.

AT THE SEA-SHORE

The river down which we have sailed (p. 22) is much wider at the mouth, forms a good harbor, protected from storms, and then empties into the *sea* or *ocean*. A visit to the wharves in the city (Fig. 21) at the mouth of the river is very interesting. There we see vessels with strange names, which have come from distant countries on voyages which in some cases have occupied several weeks, and we meet with sailors who speak foreign languages and have trouble in understanding our English language. The goods they take from their vessels include articles not grown nor made in our own country—cases of silks, boxes of tea, or great bunches of green bananas. River vessels and railway trains are near to carry these goods in many different directions, and distribute them among the towns and cities all over the land.

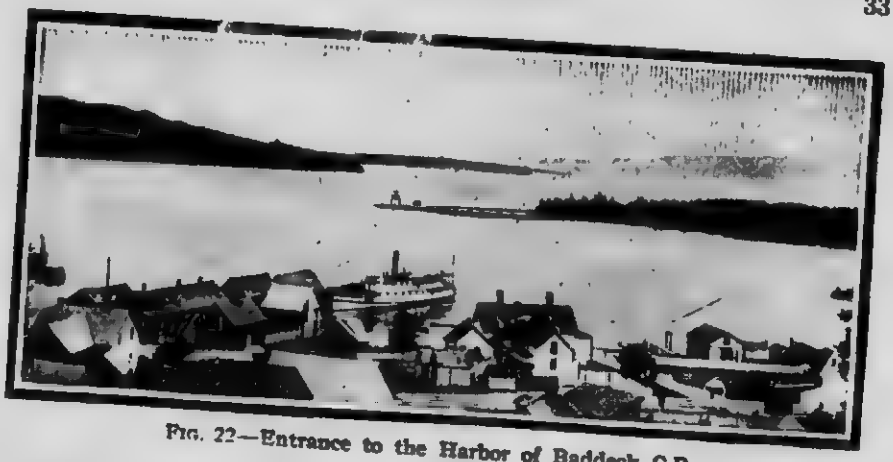


FIG. 22—Entrance to the Harbor of Baddeck, C.B.

Let us go down to the shore, or *coast*, outside the harbor. That tall tower at the entrance to the harbor is a *light-house* (Fig. 22). At night a bright light shines from its top to show sailors how they are to guide their vessels safely into the port. We look out over the waters, and cannot see the shore on the other side; away in the distance the waters and the sky seem to come together in a line called the *horizon*. Here and there we may see sails or funnels of

C

FIG. 23—Atlantic Surf, near St. John, N.B.

steamships laden with passengers or freight, and either coming to or going from the city where we are staying. How the *waves* roll! The whole surface of the sea is quite rough, and it looks as if the water were struggling to flow over the land. But when the waves reach the beach they lose their force, the water rushes smoothly up over the sand, curling into *surf* (Fig. 23), and quietly flows back again. And yet this is a comparatively calm sea. Sometimes a storm springs up—the winds howl, and the

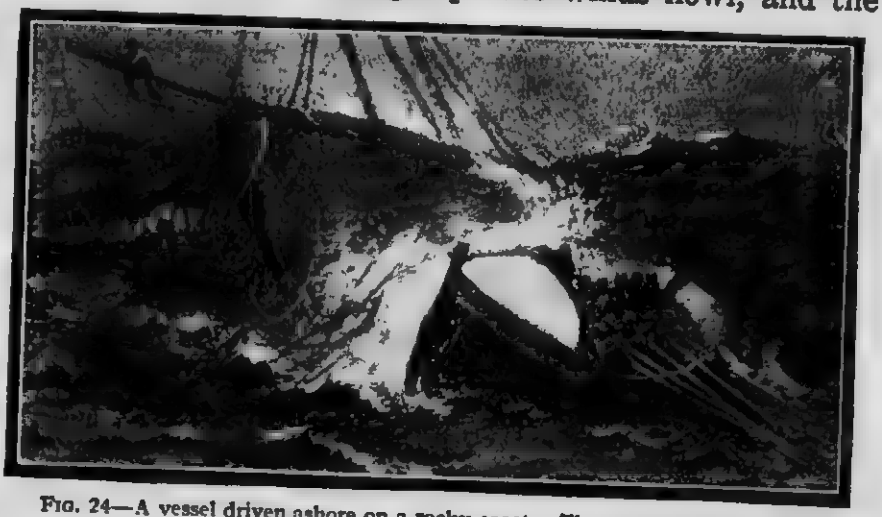
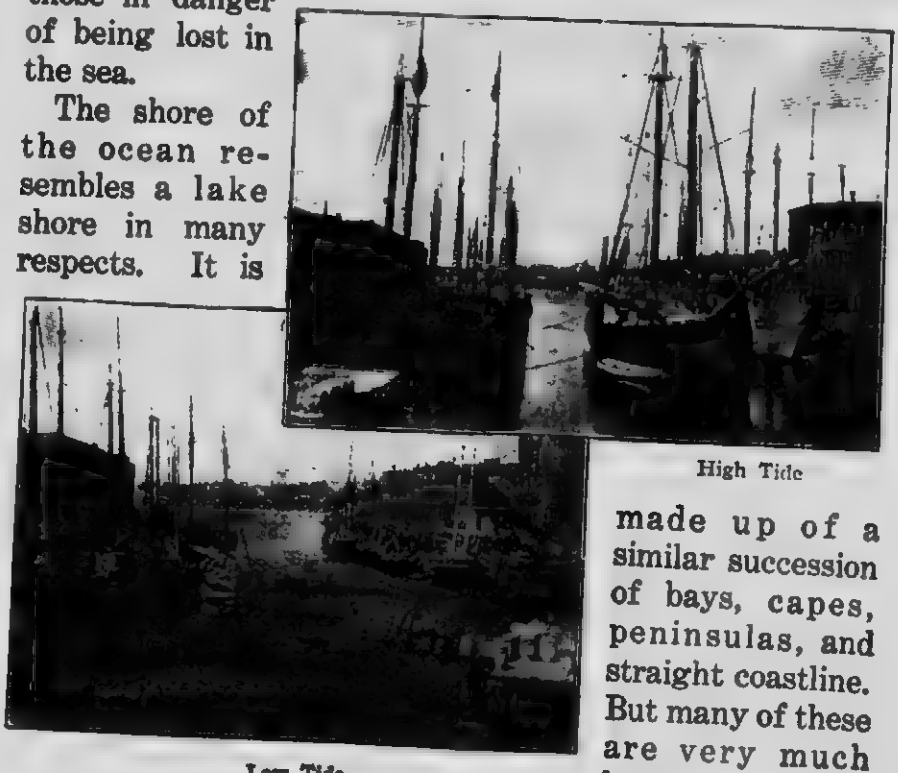


FIG. 24—A vessel driven ashore on a rocky coast. The crew on board saved by the life-boat

waves rise into great mountain-like billows. When billows strike against a rocky coast they are dashed into great masses of foam, called *breakers*. The continual action of breakers has in many places on the ocean shores worn away rocks and changed the shape of the coastline. When ships are out on the open sea they are not so much in danger of being injured by the billows, but if they be driven by a storm out of their course toward the coast, they may be thrown upon the rocks and wrecked. To prevent loss of life in this way "life-saving stations"

are kept up at dangerous points along the coasts of our country and also of some foreign countries. When a ship is driven upon the rocks a number of brave and strong men take out the "life-boat" (Fig. 24), and row out to save those in danger of being lost in the sea.

The shore of the ocean resembles a lake shore in many respects. It is made up of a similar succession of bays, capes, peninsulas, and straight coastline. But many of these are very much larger than any on a lake shore. A bay that is very large is sometimes called a *gulf*, and a cape that is high and rocky is called a *headland* or *promontory*. Though we call the vast body of ocean by the general name of *the sea*, we call a large portion nearly separated from it by land *a sea*. The ocean also contains many islands, some of which are large enough to form separate and important countries.



High Tide

Low Tide

FIG. 25—High and Low Tides in the Harbor of St. John, N.B. Note how great the difference is

The waters of the ocean do not remain at the same level. Twice every day they rise so as to cover the sandy beach or to change the peninsula to an island by flowing over the isthmus. Then they again recede, leaving vessels near the shore stranded upon the beach (Fig. 25). This is the rising and the falling of the *tide*. The reasons for it you will learn at another time. In some places the tide rises to a height of forty, and even sixty feet, while in other places it does not rise more than three or four feet.

Nearly all the rivers of the world make their way to the ocean, and so the ocean covers the lowest parts of the earth's surface. At long distances from the shore the water in some places has been found to be more than *five miles* deep. But although the ocean has so many large rivers flowing into it, it does not change in level except as the tide rises and falls. Why this is we shall learn before very long.

QUESTIONS

1. How does the ocean differ from a lake?
2. In what ways is the ocean useful to us?
3. What is the difference between waves and breakers? What is the cause of each?
4. What becomes of the material worn by the waves from the shores of the sea or a lake?
5. At what season of the year do you think the ocean is most stormy? Why?

1 Portrait of Columbus
2 Columbus at the Court of Ferdinand and Isabella of Spain
3 The Vessel, Santa Maria, in which, in company with two other small vessels, Columbus discovered America

FIG. 26

THE WORLD

Our world seems to be broad and flat, covered with plains, hills, rivers, lakes, and the great ocean. For thousands of years people believed that this was so, and they thought that if they should sail a very long distance over the ocean they would come to the edge over which they might fall to some place no one knew where. But they never found this edge of the world. So some began to say that the world was a round ball, and though at first many people laughed at this idea, it was shown after a time to be correct.

More than four hundred years ago there lived in Italy, a country over three thousand miles away across the ocean, a man named Christopher Columbus (Fig. 26). He was a brave and daring sea captain, and believed that the

FIG. 27—Portrait of Magellan. Taken from a rare old engraving

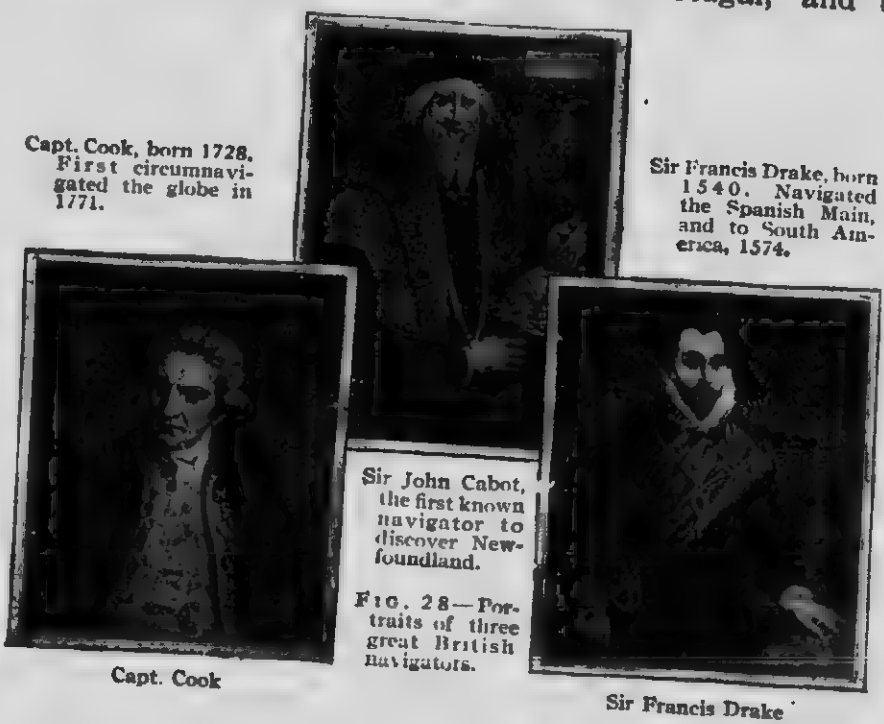
world was round. He determined to prove this by sailing round it. He tried to get ships and men in several different countries, including England, but without success. At last Queen Isabella of Spain gave him three small vessels (Fig. 26) and all necessary supplies, and he set sail toward the west over the unknown ocean. At first the voyage was pleasant, but after a while the sailors became very discontented and alarmed as they sailed day after day and week after week without finding any land. Columbus found it very hard to control his men, and they nearly succeeded in forcing him to return. He finally promised that if no land should be found in three days he would turn and sail back to Spain. During the night following the last of these three days land was discovered. Columbus thought he had reached the country called India, already known to the world as an eastern land, and so the people he found in this new country have ever since been called Indians. But he was mistaken; the world was larger than he thought, and he was not half way from Spain to India.

The success of the voyage of Columbus led sailors from different countries to undertake many voyages to find out new lands in the west, and the whole of the new country was called America. Our own country, Canada, forms part of America.

The first voyage around the world was made by a small fleet under the command of Magellan (Fig. 27), a Portuguese (that is, from the country called Portugal). When about two-thirds of the journey was over the commander was slain by some savage tribes, but the sailors continued their course till they reached home.

The names of some British sailors who made early voyages wholly or partly around the world were Sir John Cabot, Sir Francis Drake, and Captain Cook (Fig. 28). You will find it interesting to read the stories of these men and of their travels.

Your school probably has a *globe* (Fig. 29). It represents the earth, and is like it in shape, but of course it is very much smaller. With the assistance of your teacher you will be able to find on it the positions of Canada, England, Spain, Italy, and Portugal, and to



Capt. Cook, born 1728. First circumnavigated the globe in 1771.

Sir Francis Drake, born 1540. Navigated the Spanish Main, and to South America, 1574.

Sir John Cabot, the first known navigator to discover Newfoundland.

FIG. 28—Portraits of three great British navigators.

Capt. Cook

Sir Francis Drake

trace on it the course of the voyages of Columbus and Magellan.

Get some person to hold a tack with its head against the globe, on the opposite side from you, and move it over the surface of the globe toward you. What part of the tack do you see first? We see something similar to the movement of the tack on the globe when we are on the shore of the lake or ocean. The ships and steamboats farthest away look like points, or clumps of smoke, on the horizon, and with the aid of a field glass we can see the tops of the masts or the smoke-pipes, which seem to rest upon the water as if the vessels had partially sunk away into it. Those nearer show a little more of the sails, and those only a mile or so away can be seen entirely. This also is taken as a proof that the earth is round. How would distant vessels appear if the earth were flat?

FIG. 29— A Globe

How much of the surface of your school globe can you see at once? Does it make any difference from what point you view it? A globe is sometimes called a *sphere*, and any half of it, a *hemisphere*.

On the opposite page, and on pages 42 and 43 are pictures of the earth as it would appear if looked down upon from different points of view (Figs. 30, 31, 32, 33). Each of the latter show one-half of the surface of the earth, according to the centre or point from which it is regarded.

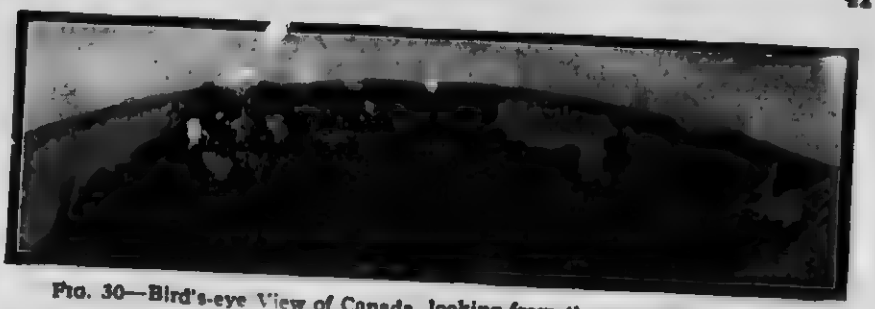


FIG. 30—Bird's-eye View of Canada, looking from the south. Notice the curve of the surface

The dark parts are land and the light parts water. Compare them with your school globe, and turn the globe into such positions that it will look the same as in the pictures. Is the land in separate or connected bodies? Each of the large sub-divisions of the land is called a *continent*. Is the water in entirely separate bodies, or is it one vast area? The parts into which it is separated by the land are called *oceans*. Which half of the world or globe contains most land—the Eastern or the Western (Fig. 31), the Northern or the Southern (Fig. 32)?

When Columbus and many other seamen explored the continent of America they sailed *westward* to reach it, so the hemisphere containing America came to be called the *Western Hemisphere*, or the *New World;* and the other the *Eastern Hemisphere*, or the *Old World*. It was afterwards found that America really formed two continents joined by a narrow isthmus.

The two continents in the Western Hemisphere are North and South America, and the three in the Eastern Hemisphere, Eurasia, Africa, and Australia (Fig. 31). What three oceans separate North America from Eurasia? What one separates South America from Africa? What one separates Africa from Australia? What continents border on the Arctic Ocean? The Atlantic? The Pacific? The Indian? Write the names of the five continents and the five oceans.

FIG. 31—The World in Hemispheres—Eastern and Western. Which contains the most water?

FIG. 32—The World in Hemispheres—Northern and Southern. Which contains . ost water ?

Canada occupies nearly all the broadest part of the continent of North America. Find North America, and then Canada, on your school globe. Find the position of Canada in those pictures of hemispheres in this chapter where it is shown.

The world is so large that one would have to travel for about two months night and day by the swiftest steamships

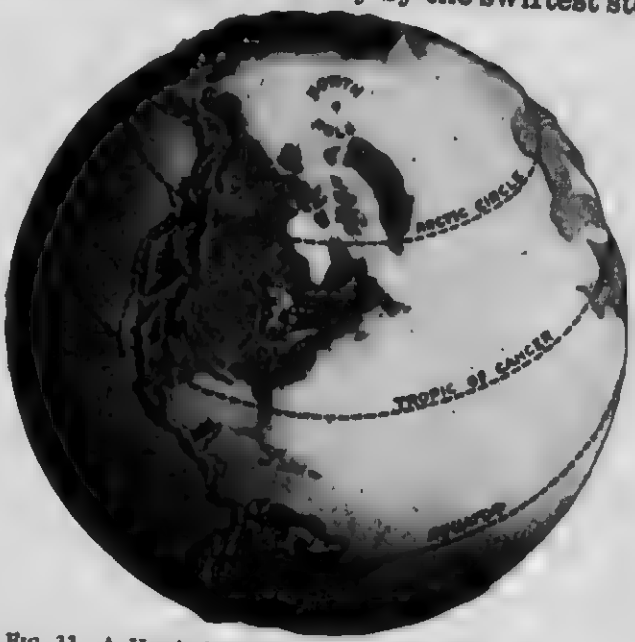


FIG. 33—A Hemisphere, with Ottawa as the centre point

and railway trains to go all the way around it. And we must remember that we can travel much more rapidly in these days than they could in the time of Columbus. In some parts of the world the weather is so cold that the people must clothe themselves in heavy furs to keep warm; in others so hot they wear scarcely any clothing the year round (Fig. 34). Some parts are very mountainous, and the chief occupations of the people are mining and tending flocks of sheep and goats; other parts are level and fertile, where cattle are numerous, and farmers can raise large crops of grain and fruits. Some

countries are settled by white people, others are inhabited by yellow people, and still others by black people. In many places people live together to form large and busy cities, while in other places one may travel for many miles and not see a solitary person. Each part of the world has its own kinds of plants and animals, and only with care can the greater number of these be cultivated away from where they originally belong.

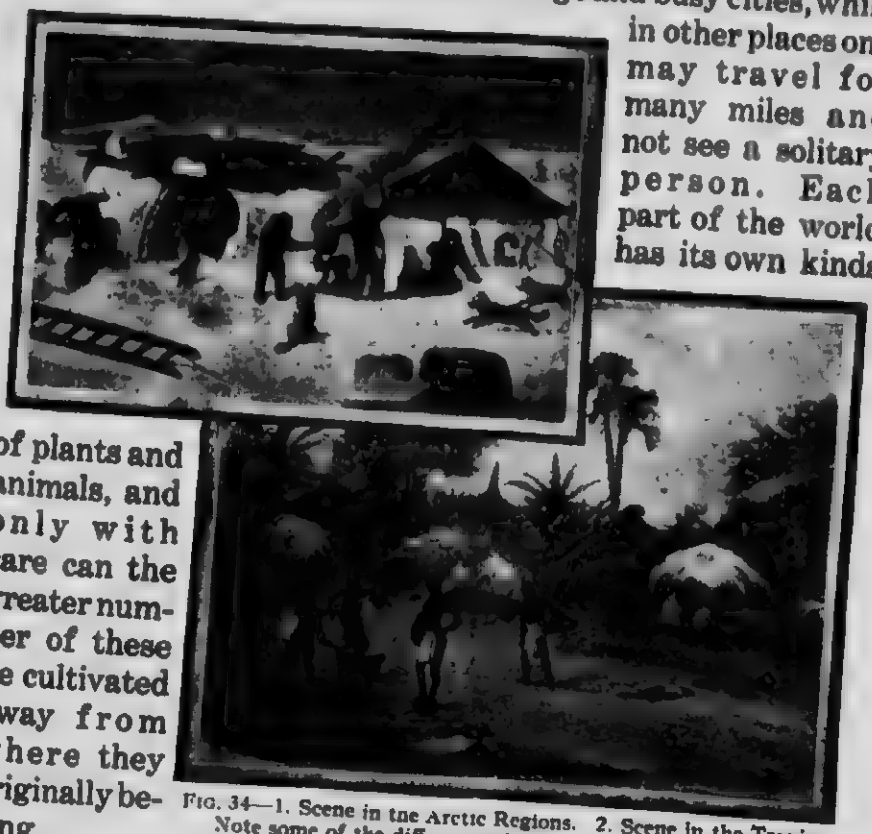


FIG. 34—1. Scene in the Arctic Regions. 2. Scene in the Tropics. Note some of the differences in buildings, vegetation, clothing of the people, etc

QUESTIONS

1. How far away does the horizon seem to be? Has any person ever been able to go to it? Why?
2. From what part of a ship is land first seen? Why?
3. From which place can you see farthest over the water, a lake beach, or the top of a hill near by? Why?
4. State two proofs that the earth is round.
5. If the waters of the ocean should gradually rise, what changes in size and outline would be brought about in the different continents?
6. In what continent do we live?

THE ROTATION OF THE EARTH

Spin a top on the table and watch it closely. All its parts whirl in circles around a line which we may imagine runs through it upward from its point. This line is its *axis.*

Toss a ball up into the air, watch it as it spins around, and try to make out the direction taken by its axis.

The earth is rapidly turning, like the top or the ball, and it therefore has an axis. The ends of its axis are called the *Poles,* one of which, the *North Pole,* is in the Arctic Ocean, and the other, the *South Pole,* is in the Antarctic Ocean. Your school globe is so made that its axis is in a position similar to that of the axis of the earth. The *Equator* is a line which we think of as encircling the earth midway between the poles. Find both poles and the equator on the globe, and in Fig. 29. The turning of the earth around its axis is called its *rotation.*

Suppose a fly should light upon the school globe and we should then carefully rotate the globe so as not to frighten the fly away. We can imagine the fly beginning to think as it looks around the room: "What a queer room this is! The desks and tables, the walls and floor, and even the teacher and scholars are all circling around me, while I am not moving at all. What can be the reason?" We often think in the same way as this fly about what we see.

FIG. 35—Top Spinning. Where is its axis? What points will thus be like the North and South Poles of the Earth?

The sun, the moon, and the stars seem to be slowly moving around us, because we view them from the rotating earth.

Whenever we move on the earth toward the North Pole we are going *North*. We have three ways of finding out which direction is north. One is by means of the North Star. Search any clear night for the group of stars commonly known as the "Dipper" (Fig. 36). The two stars forming the front of the Dipper are called the "pointers," because a line joining them leads over the sky almost exactly to the North Star, as shown in this picture. Looking along the earth's surface toward a point in the horizon right under this star, the direction is always north, wherever you may be. Another way to tell which is north is by means of a magnetized needle. Take a common steel sewing needle and rub its point a few times against the end of a magnet. Then float the needle on a piece of paper or across a couple of small straws or matches on a saucer of water. The needle will take up a position pointing almost due north, and return to that direction, no matter how often you may turn it aside. Sailors determine direction by means of a magnetized needle, because it may be used at all times—during the day, in cloudy weather, and at night. A little magnetized strip of steel, fastened on the back of a card, and carefully balanced on a pivot, is called the *mariner's compass* (Fig. 37). This strip of steel or needle is placed so as to agree with the north point on the card. All other directions can

FIG. 36—The Dipper, the Pointers, and the North Star

then be read from this card. The third way of finding the direction north is by means of shadows. Observe the direction of your shadow any bright sunshiny day at noon. Does that direction vary throughout the year? Find out in what direction it points.

When you face the north your right hand is toward the *east*, your left hand toward the *west*, and your back toward the *south*. Other important directions lie midway between these, as indicated in the diagram (Fig. 37), their names being *north-east*, *south-east*, *south-west*, and *north-west*.

Point toward all these directions, and name them as you point. In what direction are you facing when looking through the front door of the school house? Face in the direction opposite to south-west, and name that direction. In what direction does the road or street outside the school grounds run? In what direction is your desk from the door? In what direction is the school house from your home?

At your home some night take a large apple or an orange, and thrust a knitting needle or a hat pin through it from stem to blossom. Rotate it around the needle and state where the axis is. Then drive a small pin right up to its head into the fruit near its equator. Rotate the fruit on its axis near a lighted lamp, and notice that one side receives bright light from the lamp, and the other is in darkness. As the pin head is carried around it enters the light on one side, and after a time passes into the darkness on the other.

The apple or orange represents the earth, the lamp flame the sun, and the pin head yourself. As you pass into the light you say the sun is rising; as you move on through the light, you say it is day; as you pass into the darkness, you say the sun is setting; and as you move on through the darkness, you say it is night.

In what direction does the sun *seem* to move across the sky? In what direction therefore does the earth turn?

How many hours is it from one sunrise to the next one? How long therefore does it take the earth to turn round once? We call this period one *day*. We also call the period of sunlight *day*, and the period of darkness *night*.

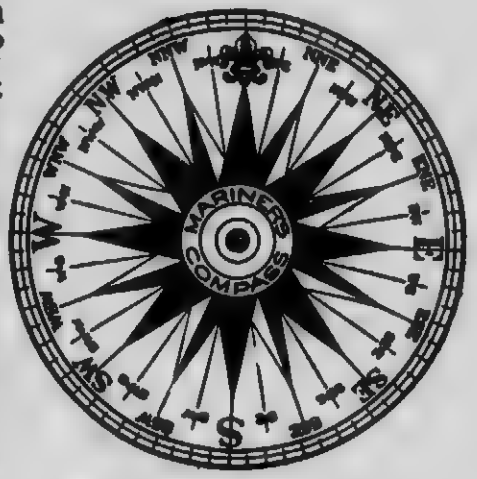


FIG. 37—The Mariner's Compass

The point of time exactly midway between the times of sunrise and sunset we call *noon*, the twelve hours before it being *forenoon*, and the twelve hours which follow it *afternoon*. Hours of the forenoon are indicated by the letters *a.m.*, of the afternoon by *p.m.*, and of noon by *m.* Thus we say 9 o'clock a.m., when we mean 9 o'clock in the morning, 4 o'clock p.m., when we mean 4 o'clock in the afternoon, and 12 o'clock m., when we mean 12 o'clock noon. Either a.m. or p.m. may be applied to 12 o'clock midnight. In western Canada the twenty-four hour system of indicating time is used by the railways, and the letters a.m., p.m., and m. are not often seen. Thus, instead of 6 o'clock p.m., the expression, 18 o'clock, is used on the railway time-tables.

QUESTIONS

1. Does the sun always rise and set at the same points in the horizon?
2. What are the general directions of sunrise and sunset?
3. Why do we believe the earth rotates?
4. State three ways of determining the direction north.
5. How long is noon?
6. In the twenty-four hour system how is 12 o'clock midnight named? What hours are named the same in both the twenty-four hour and the twelve-hour systems?

THE AIR

The wind often makes a great deal of noise and disturbance, but may also be made to do useful work. Dust, papers, and fallen leaves are raised high above the ground, and trees sway forwards and backwards before it. But if we go to a farmyard we may find a windmill, driven by the strong breeze, pumping water from the well for the horses and cattle (Fig. 38). If we go to the lake or sea shore we may see the waves, driven by the wind, rolling toward us, and dashing against the shore, and vessels, with their sails filled with the same breeze, making their way to port.

Above the land and the water is the *air* or *atmosphere*. Its importance to man, to plants, and to animals is very great. Every time we breathe we fill our lungs with it, and without it we should smother in a very few minutes. Plants use it, and would cease to grow if it should be taken from them. Animals breathe it, and birds fly through it. It drives our sailing vessels, keeps our fires burning, supplies us with rain, and aids the sun in keeping the whole earth warm. We can scarcely imagine what a cold dead world this would be without the air.

FIG. 38—A Windmill, pumping Water

When a part of the air is rushing from one place to another we say the *wind*, or a *breeze*, is blowing. Winds are named according to the direction *from* which they

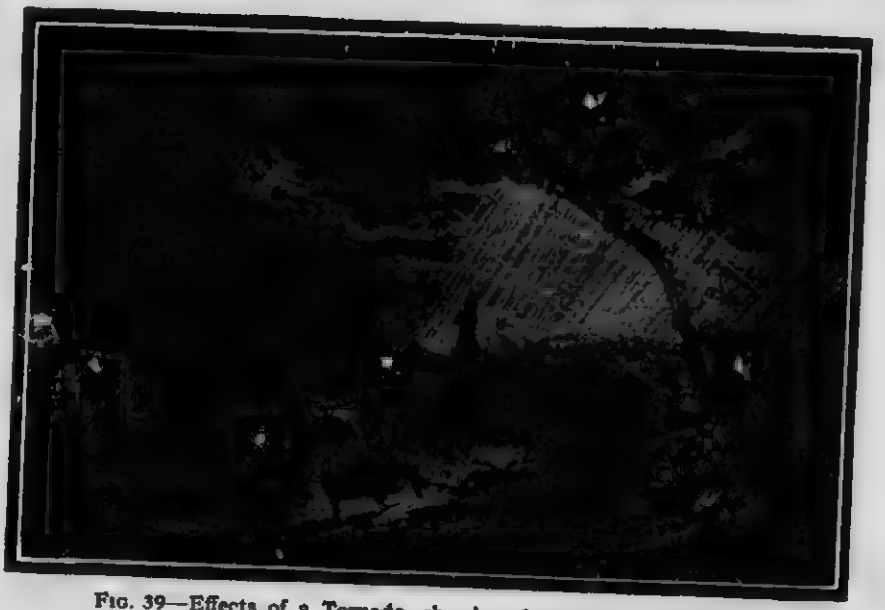


FIG. 39—Effects of a Tornado, showing the power of the Wind

blow; for instance, one blowing from the north is a *north wind*, from the east an *east wind*, and from the sea over the land a *sea breeze*.

What is the course taken by the smoke, sparks, and cinders from a bonfire or a burning building? In what direction does the hot air move in a stovepipe or above the fire in a grate? Cold air is heavier than warm air. If the two meet, the cold air will sink under the warm, and crowd it aside and upwards. Air always tends to move toward a warmer place; if it go slowly it causes a gentle breeze, if rapidly, a high wind, which may have sufficient force to blow down fences and trees, unroof houses, and sometimes destroy strong buildings and cause loss of life (Fig. 39).

Set a pitcher of ice-water on the table in a warm room, and it at once becomes covered on the outside with water in very fine drops. Did these drops come through the walls of the pitcher? Do they collect on a very cold *empty* pitcher?

The air of the room contains a quantity of water in particles so small that they cannot be seen. Water in this condition is called *vapor*. Cold air cannot hold as much vapor as warm air, so when the cold pitcher chills the air around it the particles of vapor collect together and form the fine drops of water. When vapor thus changes into small drops of water we say it *condenses*.

Let us try to see where the vapor of the air comes from. You know that if a plate or saucer containing water be set out in the sunshine, the water will all disappear in a little while. Clothes that have been washed are hung on a line to dry. After a heavy rain the pools of water formed on the road soon dry up, no matter how hard the road may be. What becomes of the water in all these cases? It has not sunk into the plate nor into the clothes, nor to any great extent into the ground. It has been *evaporated*, that is, changed into vapor and mingled with the air. Water is constantly being evaporated, especially from our lakes and rivers, and from the ocean.

Vapor is given to the air in other ways. If you breathe against a cold slate or a window pane, it will become quite wet because of moisture from your lungs. All air-breathing animals give out vapor in their breath.

When you light a lamp the chimney becomes dimmed as soon as it is put on, but in a minute or two, when it has become hot, it becomes bright again. Explain why. All fires, whether the fuel be oil, coal, wood, or gas, give out moisture into the air.

The air obtains much more moisture from evaporation than from either breathing or burning.

When the vapor of the air condenses on a cold body, such as the pitcher mentioned above, it forms *dew*. Account for the formation of dew on grass. Why do cattle and sheep prefer to lie on the road at night, rather than on the grass beside the road? When do you find the most

dew, in July or in October? Why? Is dew formed on cloudy nights or on clear nights? This is because clouds keep the air warm. How long does dew remain on the grass during the day? Why does it not remain the whole day?

Sometimes the vapor of the air is chilled so cold that it collects on surfaces in the form of fine particles of ice. This ice is *white frost* or *hoar frost*. Why does frost form on the inside and not on the outside of window panes? Why does it sometimes collect on a man's beard?

When the vapor that is in the air is condensed by contact with colder air, *fog* or *mist* is formed. Often you can see the fine particles of water floating in the air around you on a foggy morning. What is the color of a great mass of fog? Why does fog often form over a river or pond? Why can we "see our breath" on a frosty day or in a cold room? Why does fog rise from chimneys on a frosty winter morning and not on a summer morning? Why do fogs often disappear rapidly in the forenoon? What becomes of the masses of fog which rise from railway engines and house chimneys? How does fog differ from steam?

FIG. 40—Various forms of Clouds

Fogs formed high in the air we call *clouds*. How beautiful the forms they sometimes take as they chase each other across the sky! Sometimes they are light and feathery and seem to be very high up from the earth, at other times they are in large masses, like great clumps of wool, and then again they are in long layers stretching parallel with one another (Fig. 40). Then, with what splendid colors they are often tinted—gray, blue, silvery, and crimson—as the sun shines on them from different directions. Frequently in warmer weather clouds become electrified, and the discharge of electricity from cloud to cloud, or between a cloud and the earth, causes a flash of *lightning* and the loud report known as *thunder*. When the discharge is at a great distance from us the thunder is not heard till several seconds after the flash is seen, and is more or less "rolling"; but when it is near by the flash and the report are observed at almost the same instant, and the thunder is heard as a sharp report like the crack of a rifle. What is the general appearance of the clouds when we say "it looks like rain"? What causes clouds to pass across the sky?

FIG. 41—Snow Crystals, magnified

Suppose the fine drops of water you can sometimes see in fog could be made to run together, what would be formed? Would the water then remain floating in the air, or would it fall to the ground? Often the clouds become condensed, and drops of water fall as *rain*. This condensation is brought about when the clouds are carried higher into the air where it is colder. Very often clouds are driven by the winds till a high mountain range is reached, and then they are forced upwards into a colder atmosphere until they condense into rain.

If the upper air is so cold that the rain drops are suddenly frozen, *hail* is formed. Sometimes hailstones may be picked up that are as large as marbles or even larger, many smaller hailstones having combined.

FIG. 42—Clearing the railway track of snow by a powerful revolving fan or brush

When particles of water in a cloud are slowly frozen, they form *snow-crystals* (Fig. 41), and these usually collect together into *snow-flakes* which fall to the ground in winter. Catch some flakes on a piece of black cloth, and try to make out the shape of the crystals which form them. Use a lens if necessary. How many points has each crystal? Flakes vary in size—sometimes they are as large as a ten-cent piece, and at other times no larger than pin heads. Try to find out the cause of these differences. As tiny and light as the snow-flake is, a great collection of them may do much injury. Sometimes snow falls in such enormous quantities that it blocks railway trains for several days (Fig. 42), fills up country roads so that driving over them is almost impossible, and crushes in roofs of buildings by its great weight. Yet snow is of great benefit to our country. Why is it necessary for the best growth of fall wheat? How else is it useful to the farmers? The people who live near the north pole build houses of ice and snow (Fig. 34). Do you think that such houses are warm or cold?

Now let us try to follow the course of the great journey

which the waters of the earth are constantly taking. Enormous quantities of water are evaporated by the heat of the sun and of the air, from the ocean and from smaller bodies and streams of water. Clouds are in this way formed, which are carried by the wind to the mountain tops and highlands, and there become condensed by contact with colder air into rain or snow. Streams of various sizes are formed from these and drain away the water the earth has thus received to pour it back into the ocean.

Rivers collect many substances as they flow over the land, and carry them into the ocean; these are not removed by evaporation. One of the most common is *salt*. River water may taste quite fresh, but it usually contains a little salt. As thousands of rivers have been carrying salt into the ocean for many ages, the ocean water now tastes quite salty.

QUESTIONS

1. State as many proofs as you can to show there is an atmosphere.
2. Name as many uses of air as you can.
3. Do you think there is any resemblance between the way birds fly and the way fish swim?
4. How can you show that the atmosphere is made up partly of moisture?
5. Name the various forms which the moisture of the air may take.
6. What is the cause of winds?
7. If the air be cooler over the water than over the land, will the breeze blow toward the sea or toward the land?
8. What different kinds of work can the air be made to do? State some uses of windmills?
9. What harmful work is sometimes done by the wind?
10. How can you make water boil? What are the fine bubbles which rise through boiling water?
11. When does the ocean give up most moisture, when the air is cold or when it is warm?
12. From what sources does the atmosphere obtain moisture?
13. How does snow differ from hail?
14. Many lakes have inlets and no outlets, and their waters are quite salty. Why do they not overflow their shores? Why are the waters salty?
15. How can you show that the ocean covers the greatest depressions of the earth?

THE EARTH'S HEAT

Were it not for the Sun our world would be so cold and dark that nothing could live on it. It would be worse than the coldest winter night that any person ever knew.

Nearly all our heat comes from the sun. Of course in winter we fill our stoves and furnaces with wood or coal, and keep up hot fires, which make our homes warm and comfortable. But how small is the amount of heat we thus obtain! We never think of trying to warm our streets or our fields in that way.

The *Sun* is a great ball like the earth, and is heated white hot. It is many times larger than the earth, but is so very far away that it looks much smaller. Our world is at such a distance from it, that its heat allows rain to form and fall upon the ground, prevents our rivers and lakes from being covered with more than a thin coating of ice, causes plants to grow and be fruitful, and keeps animals and people comfortable all the year round.

The condition of the air as to its being warm or cold is called its *temperature*. We measure temperature by means of a common instrument called a *thermometer* (Fig. 43). In it there is a fine column of quicksilver or of alcohol which expands, or becomes long, in the warm air, and contracts, or becomes short, in cold. When the air is very frosty the column shortens till it approaches or reaches a point on the thermometer that is called *zero*.

The distance above or below zero to which it may extend is measured in short spaces called *degrees*.

FIG. 43—A Thermometer.

When the air is cold enough to freeze water the instrument indicates a temperature of 32 degrees above zero. If a thermometer be plunged into boiling water its column will lengthen out to show a temperature of 212 degrees above zero. On hot summer days the temperature rises to 70 or 80 degrees above zero, and sometimes still higher; on very cold days in winter it goes down to 20 or 30 degrees below zero, and sometimes even lower than that.

You know very well that the sun appears to rise above the horizon in the morning, to move across the sky during the day, and to set below the horizon in the evening. Select some post or similar object in the school yard, or at your home, on which the sun shines all day, and watch its shadow day after day throughout a whole year. Measure the length of the shadow to the exact inch at noon on the 21st of each month, and keep a record of the measurements. On what date is the shadow the longest? This is the time of the *winter solstice*. When is it the shortest? This is the time of the *summer solstice*. On what dates does it reach the point half way between its greatest and least lengths? These are the times of the *equinoxes* or equal day and night; the one in the spring being the *vernal equinox*, and that in the autumn the *autumnal equinox*.

Is the sun higher or lower in the sky when the shadow is shorter? When the sun is high in the sky we get more heat from it than when it is low,—in other words, rays which come vertically downward give the earth more heat than those which are in a slanting direction, because the former pass through a lesser amount of atmosphere, and strike a smaller area on the earth's surface (Fig. 44). This is one reason why summer is hotter than winter, and noon hotter than morning or evening.

Does the sun rise at the same point in the horizon and

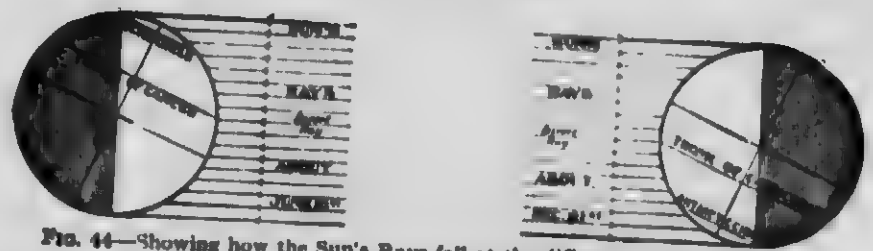


FIG. 44—Showing how the Sun's Rays fall at the different seasons of the year

set at the same point throughout the year? At what dates does it rise and set due east and west? Is its course across the sky longer or shorter in winter than in summer? Keep a record for a year of the times of sunrise and sunset, and determine from this the lengths of daylight and darkness. Now state another reason why summer is hotter than winter.

When the shadows of the post have for more than two months been growing shorter we begin to look for the approach of *Spring*. The snow melts away, and all nature awakes from its winter sleep. The trees once more put forth their leaves, wild flowers bloom in thousands over the warm hillsides, and the birds gladden us with their songs. The farmer sows his grain (Fig. 45), and awaits a crop to be gathered during the coming harvest season. Name one spring month.

FIG. 45—Spring. Ploughing in the North-West

When the shadows are shortest it is *Summer* (Fig. 46). Our weather in Canada is then hot, days are long and nights short, cattle seek the shade; sometimes no rain falls for several weeks, every one who can is enjoying a summer trip or holiday, in the country, on the land or on the water (Fig. 46); and the farmer is busy cutting his hay and harvesting his grain. Name a summer month.

FIG. 46—Summer. A Summer Day at English Bay, Vancouver, B.C.

As the shadows lengthen we know that summer is passing and *Autumn* is coming on. The air becomes cooler and more pleasant; days and nights become more nearly of the same length; leaves on the trees change their color to yellow, brown, and scarlet, and then fall to the ground leaving the branches quite bare; the farmer digs his potatoes and gathers his apples (Fig. 47); and Jack Frost whitens the grass and the board-walks morning after morning. Name an autumn month.

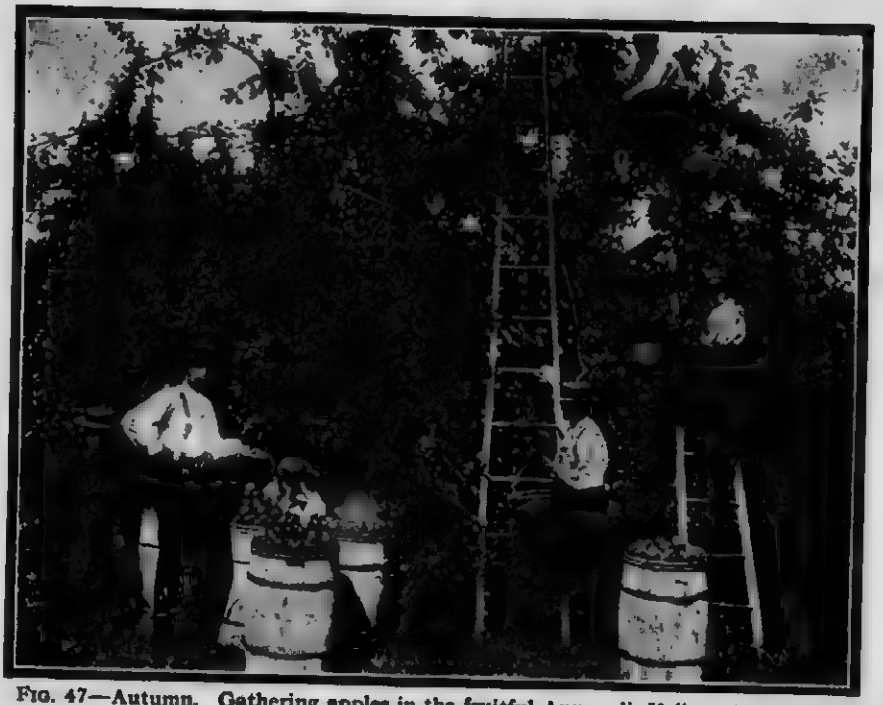


FIG. 47—Autumn. Gathering apples in the fruitful Annapolis Valley, Nova Scotia

When the shadows are longest it is *Winter*. The ground nearly everywhere in our country is covered with snow, and the music of the sleigh-bells is heard in the streets. Lakes and ponds are covered with ice, and boys and girls have healthful and delightful sports with their skates and sleds. Then it is we gather around the cheerful fireside to enjoy the long evenings, while we feel well protected against the cold whistling wind and drifting snow outside. Name a winter month.

Spring, summer, autumn, and winter are the four *Seasons*, and make up one *Year*. The spring months are March, April, and May, the summer months June, July, and August; the autumn months September, October, and November; and the winter months December, January, and February.

At and near the equator the sun's rays descend vertically at noon every day in the year, so not only is it summer there all the year (Fig. 48), but the air is very hot all the time. At the poles there is very little sunlight, because for half the year the sun does not rise above the horizon, and for the remainder of the year it rises only a short distance, so that the rays are very slanting (Fig. 44). At those places, therefore, the weather is very cold, and it is virtually winter all the year round. We in southern Canada live about half way between the north pole and the equator, so that our weather is never as hot as at the equator, nor as cold as at the poles, and we have alternately summer and winter seasons.

FIG. 48—Winter. Scene in Jamaica, near the Equator. Why, and in what points, is this so different from winter in Canada?

A systematic record of the weather should be kept for a year. Use for this purpose a common scribbling book, and rule its pages in the manner shown at the top of the next page, putting the record of a week or so on each page.

Date	Time of Day	Temperature	Direction of Wind	Force of Wind	Kind of Weather

Suitable times of day for observation are 9 o'clock, a.m.; 1.30 or 2 o'clock, p.m.; and 7 or 8 o'clock, p.m. Enter in the second column the exact time when the record is made.

To find the temperature use the school thermometer and one at your home. They should be hung up outside in some shady place, say, on the north wall of the building.

For direction of wind use the names of the points of the compass. Should you state the direction *toward* which, or *from* which, the wind is blowing? You can find out its direction by tying a piece of ribbon in an exposed place, or by observing which way smoke or steam is carried.

In the column headed Force of Wind, state whether there is high wind, moderate wind, a gentle breeze, or calm.

In the column headed Kind of Weather, state whether it is clear, cloudy, foggy, dry, etc.; and whether there is rain, snow, hail, etc.

From your records make out answers to the following questions:

At what time of the day is it warmest? When coolest? Give reasons in both these cases. Which is the prevailing direction of the wind in summer? Which in winter? Is the north wind cooler or warmer than the south wind in winter? How do they compare in summer? Does the east wind generally bring wet or dry weather? Is the west wind generally cool or warm? Does it commonly bring wet or dry weather? From which directions do our strongest winds blow? From which direction does most of our rain come? At what times of the year do we have most rain, most wind, and least wind? In what months of the year are thunder storms most common?

The heavier, lower air in which we live takes up more heat than the higher air, and the temperature becomes colder as we ascend a mountain (see p. 17), until we reach the regions of perpetual snow. This difference is about one degree to 300 feet, and the difference between the temperature at the surface of Lake Ontario and the top of Brock's Monument at Queenston Heights (about 500 feet above the lake) is therefore nearly 2 degrees.

The general condition of the atmosphere of a country, whether warm or cold, moist or dry, is called the *climate* of that country. The climate of a place depends upon the amount of heat obtained from the sun, and the effect of the heat in bringing about winds, clouds, rainfall, and snowfall.

QUESTIONS

1. Is a *low* temperature cold or hot?
2. State two reasons why summer is warmer than winter.
3. State any resemblances between travelling northward and climbing a mountain.
4. Describe the climate in which you would prefer to live.

THE EARTH'S LIGHT

Nearly all our light comes from the sun. Our best electric lamps give light for only a short distance around them, and these are kept up with a good deal of labor and expense. Even moonlight is one form of sunlight—if there were no sun the moon could not shine upon the earth.

The *Moon* is a round body much like the earth, but not so large. When the sun shines upon it, we can see the part receiving the light, like a bright body, varying in shape and size from a fine curve to a complete circle.

FIG. 49—A portion of the Moon's surface as seen through a powerful telescope

Some evening when you first see the *new moon* notice what time it is by the clock. Make a drawing of the moon as it appears to you, being careful to have its horns or "cusps" in the proper direction. Beside the drawing make a record of the date, the direction of the moon from you, and whether it was high up or low down in the sky. Repeat this *at the same hour* every evening as long as you can see the moon. Then select another hour to view it, either late at night or early in the morning, and continue making your drawings and records at that hour each day till the new moon appears again.

At the end of about one week the bright part of the moon stretches in nearly a straight line between the points. The moon is then in its *first quarter*. At the end of the next week the bright portion is a complete circle,

forming what is called *full moon*. At the end of the third week its shape is like what it was at first quarter, but its curved edge is on the opposite side. The moon is then in its *third quarter*. About the end of the fourth week it is not seen at all for three or four days or nights, until it appears once more as a new moon. The forms of the moon just named are called its *phases*.

Is the new moon on the same side of the earth as the sun or on the opposite side from it? Is the full moon on the same or the opposite side? The moon travels round the earth, making the complete journey in about four weeks. In what direction does it move, eastward or westward? How many new moons are there in one year?

QUESTIONS

1. In what directions does the moon rise and set?
2. Why does the moon rise and set?
3. Does the moon rise every day? Does it set every day?
4. Why is there not moonlight every night?
5. Is the moon ever in the sky when we do not see it? Explain why.
6. Do the stars rise and set? Explain why.
7. Why do we not see the stars during the day?

THE USES OF PLANTS

Much of the charm of the spring and summer seasons is due to the beauty of the trees, the grass, and the flowers. Even in autumn, when leaves have taken on their golden and crimson tints, and flowers have grown into fruits, this beauty is increased. And there is beauty not only in natural vegetation, but also in the handsome appearance of our parks and gardens, with their well-trimmed lawns and shrubbery, and delightful flower beds and shade trees. This world would be bare and desolate if it were not covered with vegetation.

But beauty is not the only use of plants. A complete description of their value to man would fill a much larger book than this one. Were it not for them animal life

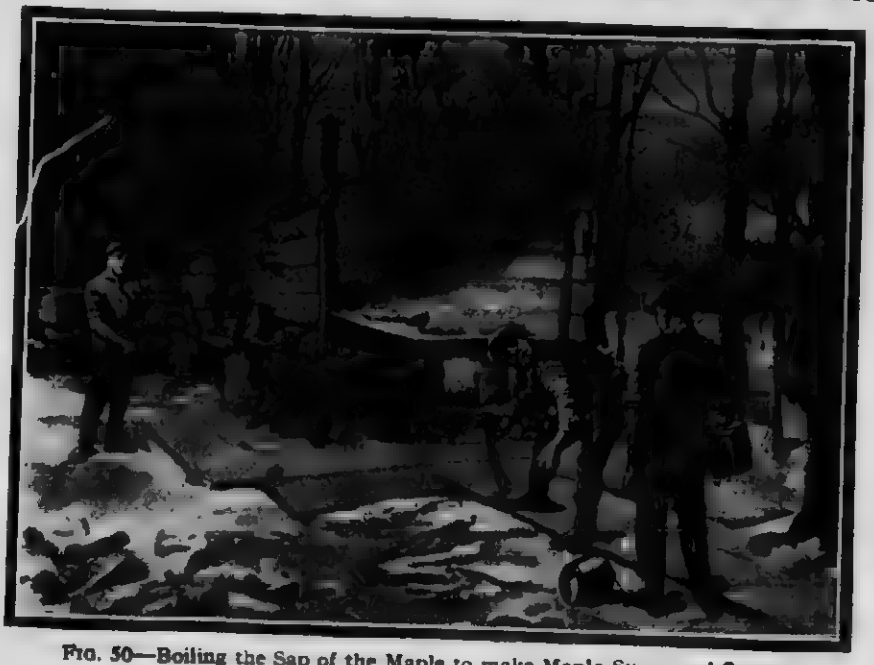


FIG. 50—Boiling the Sap of the Maple to make Maple Sugar and Syrup

could not exist, and man would be without food, clothing, fuel, lumber, and many other necessaries.

We use the roots of many plants. Name some plants which the farmer raises that have fleshy roots. Search in a good dictionary or other book to find what tapioca is.

Sometimes we use bark. What trees have bark that is good for tanning purposes? For what do Indians often use birch-bark? What is cork? What is cinnamon?

The sap and oil contained in many plants are of great use. Every spring thousands of Canadian sugar maples are "tapped," and the sap which trickles out of the trees is "boiled down" into syrup or sugar (Fig. 50). In Canada, as well as in some other countries, sugar is also made from the juice of the sugar beet, and in warmer countries from the juice of the sugar cane. The sweet taste of plums, peaches, and other fruits is due to the sugar they contain. Try to find out how bees collect and store up honey from flowers. Turpentine and resin are made from the thick sap of the pine tree; India-rubber is made by heating the milky sap of the rubber tree (Fig. 51); and sweet oil, castor oil, and many other oils are extracted from different kinds of plants. Name some trees or herbs from which any kinds of medicine you know of are prepared.

For what purposes do we use the wood of trees? Name some trees that are good for each of these purposes. In many parts of Canada the wood of the spruce and other trees is soaked and ground into pulp, and from this pulp paper is prepared, not only for writing, printing, and wrapping purposes, but also to be made into tubs, pails, and other articles. The fibres in the stems of plants are sometimes valuable. What is linen? Of what is rope made?

What part of the wheat plant is the "grain"? What part is the "straw"? Name four or five other plants of

which we use the same parts. Place a few large "grains" of tea for a few minutes in warm water, then carefully unroll them, and state what part of the tea-plant you think they are. What are fruits? Name as many fruit trees as you can. What parts of the rhubarb, cabbage, onion, pea, pumpkin, asparagus, and celery do we use? What is a nut? Name some nuts that are good to eat. What is a berry? Examine closely a clove; it is a flower bud with its long and hard stem and cup.

FIG. 51—A Rubber Tree, showing a native emptying the cups containing the sap, Para, Brazil

QUESTIONS

1. In what respects does the pine tree differ from other trees?
2. In what ways do forests benefit the soil?
3. What parts of plants are useful?
4. Name three plants from which we obtain sugar.
5. State the uses of as many plants as you can.

WHAT PLANTS NEED

In order that plants may properly grow they require the right kind of *soil*, and suitable amounts of *water*, *light*, and *heat*.

Let us try to find out what soil is. If we fill a flower pot with a quantity of pounded rock, or with sand gathered from the bottom of a creek or from a lake beach, and try to grow flowers in it, they will wither and die in a short time. If we use, instead of the sand, some clay from deep down in a well we shall not meet with much better success. But if we fill it with earth from the garden, the flowers will grow very well.

Name some trees which lose their leaves in the autumn. Name some plants which die in the autumn. What becomes of fallen leaves and dead plants? If we watch a man digging a post hole on the border of his orchard, we notice that he first cuts through the grass and easily digs out the soft earth. As he goes deeper the earth becomes harder, gravel and a few stones are found, and the color of the ground changes from dark brown to light yellow. Still

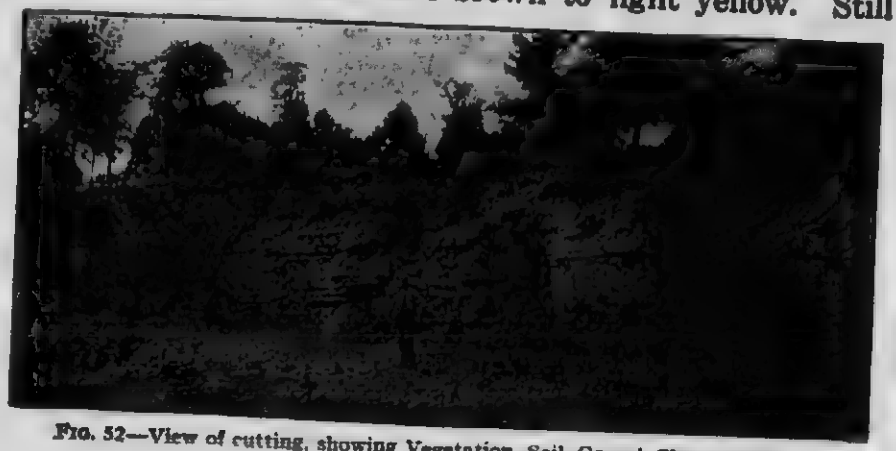


FIG. 52—View of cutting, showing Vegetation, Soil, Gravel, Clay, and Rock, on the Credit River, Ont.

farther down he must use a crowbar to loosen the hard clay and larger stones before raising them with his shovel, and after a time he comes to the solid rock (Fig. 52). The layer of soft earth on the surface is the soil best suited for plants. It usually contains a little sand, a good deal of clay, and a quantity of partially decayed grass, and roots, stems, and leaves of plants. Why then is it dark in color?

FIG. 53—Weathered Rocks at Cape Hopewell, N.B.

Plants take from the soil what they need as their food. Sometimes nearly all the food required by a certain kind of plant is thus taken out of the soil. Then, in order to grow that kind of plant again, the soil must be enriched. Farmers enrich soil by using various kinds of manure, and they make soil last longer by changing the kind of crops on a field from year to year. Perhaps the chief cause of richness in the soil is the work of the earth-worm or "fish-worm." There are millions of these little creatures in the ground, living on the decaying vegetation, and in order to get their food they pass great quantities of soil through their bodies. Why do we not wish them in flower pots if they improve the soil?

Soil is formed by the decay of plants and the decay of rocks. The action of rains, frost, and sunshine causes rocks to become "weathered" (Fig. 53), and their surfaces become crumpled and are carried away by rain and mixed with decayed trunks, branches, leaves, and fruits of trees.

Where, then, do you think it is deepest—in the valleys or on the hilltops? Where may you expect to find the richest soil—in the woods or in the open fields? Why? Do all plants grow in the same kind of soil? Will a plant which grows well in sandy soil also grow well in clay? In what kind of soil do you find thistles? Mushrooms? Pine trees?

Plants need more or less water. Clover, dandelions, and burdocks stay green when the grass is dying from lack of rain. Examine the length of their roots, and account for this. Why do we water house plants, garden flowers, and lawns? Why do we place the stems of cut flowers in water? Set a Chinese lily or a hyacinth bulb on a heap of pebbles in a saucer or shallow bowl, and keep the pebbles covered with water (Fig. 54); the bulb will grow and develop beautiful flowers. In early spring take a common turnip, cut off the point, and dig into it a cavity about as large as that of a small egg-cup; hold it with leaf-end downwards, and hang it by three strings in the sunshine, keeping the cavity filled with water. Soon green leaves will grow from its under side, turn upwards, and enclose the whole turnip. Slips of oleander and other plants take root in a bottle of water. Beans will grow for a few days in a tumblerful of sawdust, if the sawdust be kept thoroughly wet all the time. If lilac branches be cut in January or February and placed in a warm room in the sunshine, with their cut ends in water, they will develop their leaves and flower clusters.

FIG. 54 — Hyacinth flowering in a vase. Observe how the roots extend into the water in the vase.

Nearly every summer we have a period of dry hot weather. Cisterns become empty, the grass dies, dust becomes deep on the roads, and is carried in great clouds when raised by a passing waggon, and everyone wishes for rain to cleanse and cool the air. There are many parts of the world where no rain falls throughout the year, where nearly all vegetation is dead, and where the whole land is a hot desolate sandy or rocky waste. Such regions are called *deserts* (Fig. 55). They are barren, not usually because the soil is poor, but because they get no rain. Wherever a spring is found in a desert, the land around it is covered with grass and trees, and the fertile spot is called an *oasis* (Fig. 55). In some places where little or no rain falls, people bring water from distant mountains through pipes or canals and distribute it over the land. They can then raise as good crops as in those places where rain falls. This watering of the land is called *irrigation* (Fig. 56).

Arab crossing a Desert on a Camel. Camels can travel a long distance without water.

FIG. 55

FIG. 55—Oasis in the Desert of Sahara

Plants which require much water grow in low wet places. Willow trees prefer banks of streams, water lilies send their roots into the mud in the bottom of a pond, and water cress grows in the beds of creeks. Name other trees or plants which grow in wet places. Name some which prefer dry ground.

Plants do not grow properly without sunlight. Place a heavy board on growing grass for two or three days, and then raise it. What is the appearance of the grass? Examine the vines of potatoes which have began to sprout in a dark cellar. What is their color? Are they healthy and strong, or are they easily broken? If there be a window in the cellar notice whether they are growing out toward it or not. Examine house plants that are in pots near a window. Do the leaves and branches turn toward the window, or do they reach out in various directions? Some flowers require more sunlight than others. The dandelion and the wild rose grow in bright light, while the pansy, anemone, and blue violet seek the shade. In which do the may-apple (mandrake) and wild lily (trillium) grow—bright or dim light? Why is the sunflower so named?

Plants require various degrees of heat. Trees of all kinds live for many years, no matter how keen the

FIG. 56—Galt Irrigation Canal, Southern Alberta. The water is brought from the Rocky Mountains, a distance of sixty miles

winters' frosts. Many weeds remain green until after the first snow falls upon them. Some of our house plants grow well when set out in the garden for the summer, but they must be brought into the house before there is any frost. Other house plants are never set out. Name some plants the seed of which is ripe in early summer. Name others of which the seed does not ripen till late in the autumn. When do farmers sow and harvest fall wheat? When spring wheat? Compare the times of ripening of harvest apples, russets, and snow apples.

QUESTIONS

1. Is it the sand or the clay in soil that makes it become sticky when wet?
2. Distinguish mud, dust, and dirt from each other.
3. Why is building-stone taken from deep in the earth?
4. What are some of the uses of sand?
5. State what you mean by soil, and tell how it is formed,—how it may become poor,—and how it may be enriched.
6. What are the uses of roots to plants? How far do they extend into the ground?
7. What is sap? Where and how does the plant obtain it?
8. Will a plant which grows in very wet ground grow equally well in dry ground?
9. Why do the cheeks of some apples become red?
10. Why does vegetation change at different heights up a mountain side?
11. Why are there very few plants in the far north?
12. What causes roots and seeds to begin to grow in the spring?
13. Name any flowers you know of that close at night or in cloudy weather, and open in the sunshine. Why do they do so?

THE DISTRIBUTION OF PLANTS

The conditions of plant life—proper soil, moisture, light, and heat—cause a great variation amongst plants over the world. We cannot grow oranges or bananas in Canada, but must bring them here from warm countries; while in those warm countries very little wheat is grown, although no country in the world surpasses Canada in the quality of its wheat. Generally where there is much rain the plants found are those which require much water, and they grow very large and very rank (Fig. 57); while in dry regions vegetation is scanty, or disappears entirely.

One cause of the spread of plants over a district is the distribution of their seed. Examine the seeds of the maple, pine, thistle, dandelion, and burdock, and try to discover by what means they are carried away from the plants on which they grew. You would be much interested in finding out the way many other common plants scatter their seed.

FIG. 57—Dense Tropical Vegetation. Why is it so luxuriant?

Man has transferred many useful plants from their original homes to distant lands. For example, he has taken wheat and cotton from south-western Asia, coffee from eastern Africa, Indian corn from the warmer parts of North

America, and the potato and tomato from South America, and planted them in many countries where they were not found before. Our cultivated flowers and fruit trees were once wild, but they have been brought to our gardens, and have been carefully trained, so that their blossoms are much more handsome, and their fruit larger and more luscious than when in the wild state. You well know how much the climbing rose or the moss rose of our gardens exceeds in size and coloring the wild rose of the fields, and the large Concord or Rogers grapes surpass in size and sweetness the wild grapes of our rocky hillsides. Compare also cultivated and wild cherries, plums, strawberries, and raspberries.

In a large portion of Canada, particularly in the east and west, the country is covered for many hundreds of miles in extent with trees and undergrowth, in some places set thickly together, and in others more open. An extensive growth of this kind is called a *forest*, or the *bush*. Much timber, pulpwood, and fuel are obtained from the pines, spruces, and hardwoods of these forests, and thousands of men are employed cutting down the trees and preparing their products in saw mills and paper mills. South-eastern Canada was once entirely covered with forest, but in the last one hundred years many settlers have cleared up a large part of the country, leaving on their farms only small collections of trees, which they call *woods*. Name the different kinds of hardwood and softwood trees you have seen in the woods, and state the uses that may be made of each.

In western central Canada there is a wide district of nearly level land extending over hundreds of miles, on which no trees were ever found except along the banks of the rivers. Those who first visited that part of the country found it covered with very tall coarse grass waving before the wind, and as the discoverers were Frenchmen,

they gave these vast meadow-like plains the French name *prairie*. The only inhabitants they found there were Indians, and countless numbers of bisons (*buffaloes*), fur-bearing animals (Fig. 92), and prairie fowl. Every autumn the grass became dead and dry, and frequently caught fire, and the flames spread with terrific swiftness, carrying death and destruction in their course. The prairies are now being rapidly settled, and the fertile land yields enormous crops of wheat and other grains (Fig. 44). There are prairie-like districts in other continents, but they are known by other names which you will learn at a later time.

FIG. 58—The Big Tree, Stanley Park, Vancouver, B.C.

Some parts of Canada are noted for their fruits. The districts near the Pacific in the west, and near the Atlantic in the south-east, and the extreme southerly part in the interior are all noted for their rich orchards and fruit farms. Name the principal garden fruits which grow near your home.

There are many strange plants in foreign countries, as well as in our own, about which you have yet to learn. In some places the trees are so large that a top buggy (Fig. 58) may stand inside one of their trunks, and have room to spare on both sides. In others the top of a single tree may spread wide enough to shelter under its branches

FIG. 59— A Banyan Tree, in India. Note the main trunk and how the branches descend and take root again. Compare with the size of the animals

a regiment of soldiers (Fig. 59). Name as many common fruits and nuts as you can, which do not grow in this country. Many a Canadian is living where oranges and pineapples are plentiful, and yet he is longing for the pleasure of a taste of a good apple.

Several countries are represented in poetry and in pictures by flowers or leaves. The emblem of England is the *rose*, of Scotland the *thistle*, of Ireland the *shamrock*, and of France the *lily*. The emblem that has been adopted for Canada is the *maple leaf*, because the maple tree is so common in our country, and so useful to us. State some uses of the maple.

QUESTIONS

1. Why are plants not the same all over the world?
2. State two causes of distribution of plants.
3. For what purpose do plants bear flowers?
4. Name some of the early spring flowers, and describe where they grow.

THE USES OF ANIMALS

People who live near the north pole depend upon animals for nearly all their supplies. They eat the flesh of seals, polar bears, fish, and birds; they dress in fur of the bear, the seal, and other animals (Fig. 34); they heat and light their huts by burning whale oil, and in some places cover them with the skins of animals. Near the equator animals are scarcely used for any of these purposes; the people eat fruits which grow without cultivation, dress themselves scantily in home-made cloth woven of cotton or other plant material, and live in bamboo or grass houses (Fig. 34). We live about half way between the north pole and the equator, and make use of both animals and plants, as well as minerals, for our supply of food, clothing, shelter, heat, and light.

At one time all animals were wild—cattle, sheep, and dogs, as well as bears, wolves, and lions. Man had to hunt animals to defend himself against their attacks and to provide himself with food and clothing. But it was afterwards found that some animals could be tamed and trained to work, and could also be used to supply many things that were needed. So those most suitable were *domesticated*, that is, brought to live at our homes. Name as many kinds of domestic animals in Canada as you can, and state the various uses of each.

There are not the same kinds of domestic animals in all parts of the world (Fig. 60). In South America the llama, an animal not unlike a large sheep, is used to carry loads down the mountain sides, and its young is used for food. People in northern Africa and other sandy desert regions (Fig. 55) travel on camels, and in southern Asia on elephants. In the mountains of central Asia the yak, an animal about as large as a cow, and

FIG. 60—ANIMALS

1. Llama train in the Andes, South America.
2. Elephants lifting teak logs in India.
3. A Kalmuck woman on a Camel.
4. A Lapp child on a Reindeer.
5. An Ox-train in Tibet.
6. A Belgian milkwoman with Dog-cart.
7. A Dog-train in the North-west.

covered with long black hair, supplies the people with milk and with hair to weave into cloth, and serves as a beast of burden. In northern Europe the reindeer draws all the heavy loads in boat-like sleighs, and provides its owner with milk while it is living and meat after it has been killed. In northern Canada six or eight dogs are harnessed to a sleigh laden with goods or people, and travel over the ice and snow. Dogs are used in Europe too for drawing loads; also oxen and asses in various countries for the same purpose.

Not only domestic, but also wild animals are useful. The flesh of bears, deer, partridge, and wild duck is always considered good eating, and at one time along with buffalo meat formed an important part of the food of the Indians. Fish are wild animals, and many kinds are taken in countless numbers to be used as food. The fur of the beaver, otter, seal, bear, fox, and many others, has long been valued (Fig. 92). When Canada was first settled, the chief wealth of the country was in its furs, and for more than a hundred years very little clearing of the forests was done in order not to injure the fur-trade.

In the summer-time take a common caterpillar and place it in a small barrel or box. Put in also some leaves of the kind of plant on which it was found, and some branches of any kind of tree, taking care that the latter do not lie flat on the bottom. Then cover the box with a piece of fine netting through which you can easily see. The caterpillar will feed on the leaves for two or three weeks or less, and then will enclose itself in a shell made of very fine thread, and suspend itself from one of the branches you have supplied. After remaining in this shell for a week or two it will come out a perfect moth or butterfly. In many warm countries the mulberry tree is grown, and on its leaves a certain kind of worm or caterpillar feeds until it

encloses itself in its case. Then it is killed by dipping the case, or cocoon, into hot water, and the thread of the case is unwound and spun into heavier thread, or woven into cloth. This is how *silk* is made, and the worm is called the *silk-worm* (Fig. 61).

FIG. 61—The Silk-Worm in its various stages. 1. The Moth. 2. The Caterpillar. 3. The Cocoon. 4. The Chrysalis.

What is leather? What is wool? What is ivory? From what is glue made? Name as many animals as you can that are used as beasts of burden. Name as many as you can that are used as pets. Name any from which medicine is prepared. Name any that yield a dye. Name any that provide fuel and light. Name a bird that is sometimes used to carry letters. State as many uses of animals as possible, and name some animals put to each of these uses.

QUESTIONS

1. From what other animals besides the cow is milk obtained?
2. In what different ways do we use milk?
3. Which of our domestic animals is the most rapid traveller?
4. What is the largest domestic animal in the world?
5. Name some of the principal water animals that are used as food.

SOME DIFFERENCES AMONG ANIMALS

Name as many animals as you can that eat grass, hay, fruit, or other plant food. Name as many as you can that eat other animals, or any kind of animal food. Nearly all animals may be classed as either plant-eating, or flesh-eating. Occasionally some flesh-eating animals will eat plant food. The polar bear, which generally lives on fish and seals, will greedily devour grass when he can get it. Though dogs are fond of bones, and cats like milk, fish, and mice, they willingly make a meal of potatoes or bread. Which are the more fierce, plant-eating or flesh-eating animals? Which kind does man use as food?

Animals depend upon plants for their food. The flesh-eating animals would starve if vegetation did not support

FIG. 62
How different animals are adapted for their mode of feeding.

1. The Elephant.
2. The Flamingo.
3. The Ostrich.
4. The Giraffe.

those animals on which they feed. The owl eats the squirrel that lives on wheat and nuts, and the eagle eats the deer that lives on grass, leaves, and wild fruits.

All animals are specially adapted for their methods of pursuing, seizing, and eating their food (Fig. 62). Why have the duck and the goose flat breasts and webbed feet, while turkeys and hens have pointed breasts and feet without webs? Why have storks and some other aquatic birds, which live on fish and frogs, long legs, long necks and long bills? Why have hawks, which eat small birds, sharp eyes and sharp talons? Why has the woodpecker a long sharp bill, and how does his tail aid him in securing his food? Ostriches do not need to fly to obtain their food of leaves, grass, and fruits, so their wings are small, but as they need to be able to run fast, their legs are long and strong, and as they sometimes have to reach long distances to the ground or to the tops of trees, their necks are long. The giraffe, which eats grass or the fruit and leaves of tall trees, requires its long neck. Why are its legs so long? The elephant, which has a very short neck, would have difficulty to get either the grass or the leaves and fruits on which he feeds, if he had not his long trunk. Compare the teeth of the dog with those of the horse; why is there a difference? What is the chief use of the front teeth of a mouse? What of the back teeth? Name any other animals that have teeth like those of the mouse. In what ways is the cat specially adapted for catching mice? The owl for catching squirrels? The cow for "cropping" grass? What is the food of man, and how are his teeth suited to the food he eats?

The coverings of animals are suited to the climate in which the animal lives. The polar bear in the frozen regions of the north has a thick coat of fur, while the elephant in the warm countries near the equator has

FIG. 63—The Whale. Note its surroundings

scarcely any hair. The fur of the moose or the beaver is much thicker than that of the lion or the monkey. The whale, in the icy waters of the far north or south, has a thick covering of fat, called "blubber," just inside his skin, which helps to keep him warm (Fig. 63). The original home of the sheep was high up in the mountains; why should he have a thick coat of wool? Some animals lose their hair or their feathers every year; in what season of the year? Why cannot flies, grasshoppers, mosquitoes, and other insects endure the winter season? In what ways do frogs, swallows, snakes, and muskrats keep themselves warm during winter? How do hens and pigeons keep their toes warm on winter nights when perching? Why do we cover horses with blankets in winter, and not cattle? Name some birds that stay with us throughout the winter.

Animals do not always live agreeably together. The wolf tries to eat the beaver, the eagle tries to carry away the lambs from the flocks or the deer from the forests, and

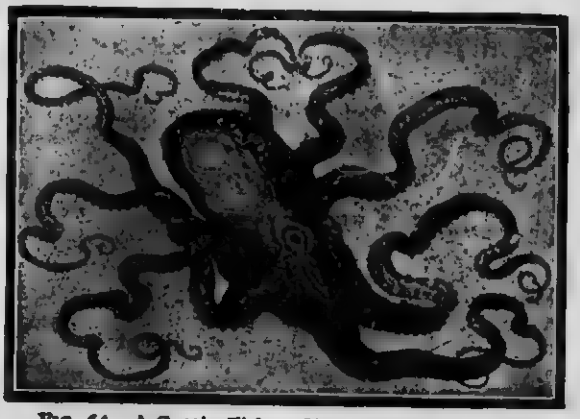


Fig. 64—A Cuttle-Fish. How many arms has it?

one sparrow tries to steal a dainty worm or apple-core from another. The various methods of self-defence cause important differences among animals. Name any animals you know that defend themselves by biting, scratching, running away, or kicking. How is each one you name specially fitted for its own method of defence? How do the cow, bee, frog, grass-snake, caterpillar, turtle, and common house-fly defend themselves? Try to find out the means of defence of other animals which you often see. Why are hares dark gray or brown in summer and white in winter? Why have rabbits such large ears? The mole has found its safest place underground, and he has been living there so long that his eyes have become no longer of much use to him, but his nose and claws are well adapted for burrowing. Monkeys are safer in the trees than anywhere else, and they are now expert climbers. The cuttle-fish (Fig. 64), when in danger, darkens the water all around him by an inky liquid from his body, and then escapes

Fig. 65—A Flying Fish, pursued by a Shark

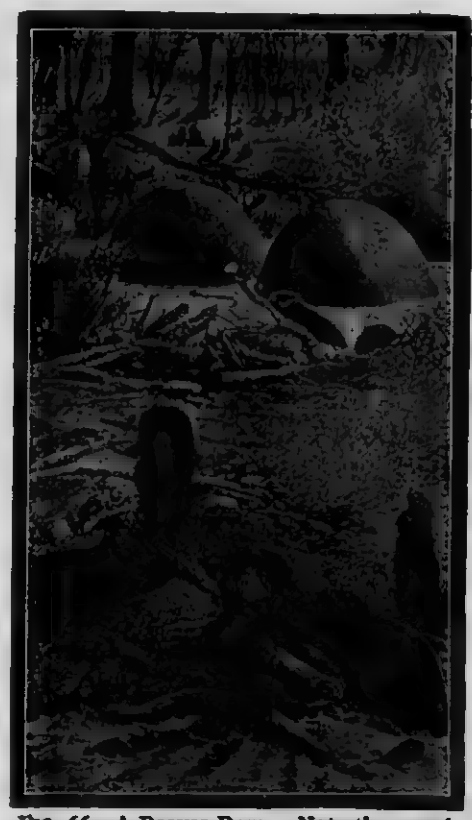


Fig. 66—A Beaver Dam. Note the round houses without visible entrance

unseen. The flying fish, when attacked by a shark, leaps out of the water for many yards through the air (Fig. 65). The ant-eater, when pursued, rolls himself into a ball and covers himself with his bushy tail, and resembles a heap of dead grass. The elephant strikes with his trunk, the ostrich kicks *forwards*, and the loon and other water birds dive and remain under water a long time.

For what purposes do animals use their homes? Name some that have no homes? Many make their homes in places that are hidden or hard to reach. Squirrels seek some hollow tree, and bury in the ground near it stores of nuts for the winter; although the ground be covered with snow, the squirrel never forgets the exact position of his storage holes. The beaver burrows into the bank of a river or creek, and builds his house on the bank at the end of his tunnel. There is no opening to the outside, and by building a dam of logs and mud across the stream he causes the water to rise and cover over the entrance to his home (Fig. 66). These dams are often quite large and strong, creating ponds, or "beaver meadows," as they are called.

Name other animals which make their homes under ground. Name some that live under logs and stones. Where does the mouse make its nest, and out of what does he make it? Some birds hide their nests in the grass, others in the thick foliage, while others again build them on the top of some high cliff where none of their enemies can get near them (Fig. 67).

FIG. 67—An Eagle's Nest on a ledge of a rocky precipice

QUESTIONS

1. State some differences between plants and animals.
2. Into what two classes are animals divided, according to the food they eat?
3. Name some animals that eat grain, and some that eat nuts.
4. What are some differences between land-animals and water-animals?
5. Name some water-animals that stay in one place all the time. How do they get their food?
6. Name some animals that can live both in the water and on the land.
7. Describe the methods used by some animals to protect their homes.
8. By what name is the home of the bear known? How does the bear spend the winter? What is the food of the bear?
9. In what respects do birds differ from other animals? Is the bat a bird?
10. What are some of the chief causes of variation amongst animals?

THE DISTRIBUTION OF ANIMALS

By what different methods may animals travel or be carried from one place to another? Which of these would cause the widest distribution of animals?

Animals scatter themselves over a region in search of food, and may go as far as their food is found. Sometimes they are driven long distances by other animals that attack them.

But the chief cause of the distribution of animals is the work of man. He has taken many useful animals, such as the horse, the cow, the sheep, and the pig, from Europe, and placed them in North and South America and Australia, and they are now found in those continents in very great numbers. He is also destroying injurious animals. Wolves, bears, and other ferocious animals of Canada are not now found in the well-settled parts, and there are very few fierce animals in Europe, although a thousand years ago they were very numerous and of many varieties. Some of the less injurious animals also are disappearing before man. The bison or buffalo (Fig. 68) of North America and the elephant of central Africa and southern Asia are becoming scarce. In our own country it has become

FIG. 68—Buffalo at Banff, in the Canadian Rocky Mountain Park. Only a few, carefully guarded, remain out of the countless thousands that formerly roamed over the prairies

necessary to protect deer and some kinds of fish and birds to prevent their total destruction.

Animals are prevented from distributing themselves over certain districts because of mountain ranges, deserts, or oceans in their way, or because the climate is not suitable. Many species are therefore kept within certain limits, forming *animal regions*, just as there are regions where some plants grow and others do not. The various animal regions and the barriers which surround them you will study at another time.

Some countries have animal, as well as plant, emblems. We often speak of the British *lion*, the Russian *bear* (Russia is a large country of Europe), or the American *eagle* (the United States of America, the country bordering Canada on the south, often, though incorrectly, called America). The animal which has been adopted as the emblem of Canada is the *beaver*, probably because that animal is hard-working and intelligent, and was found in very large numbers almost everywhere in Canada when the country was first setttled.

QUESTIONS

1. Why are wild animals gradually becoming less numerous?
2. What are the chief barriers to the distribution of animals?
3. What are some causes of distribution of animals?

PEOPLE AND THEIR HOMES

In the centre and south of Africa the people have black skins, and are known as Negroes (Fig. 69). In many places on that continent a white man may not be seen for years, and when one does appear he is an object of great curiosity. The children run to have a good look at him, and while keeping at a safe distance they smile at his white skin, straight hair, thin lips, and at the queer clothes he wears. We may imagine with what wonder these little black people might listen to an account of the white children of Canada, their warm clothing for winter, their skating and sleigh-riding, their football, their dolls, the houses of brick, stone, or wood in which they live, and the strange things they eat, all of which seem so common to Canadian boys and girls. The wonder and interest of the little yellow people in the east of Asia, the brown children of the islands near Australia, or the happy fat-faced little fellows in the islands north of North America also would be great.

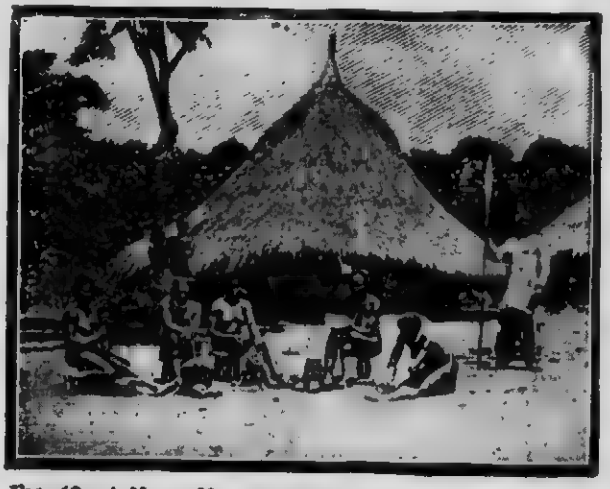


FIG. 69—A Negro Home and the People in Central Africa

And are we not just as interested in finding out all we can about the boys and girls in distant lands—what they look like, what they eat and wear, and how they play—and about their fathers and mothers—the

FIG. 70—Liberated Slaves from Central Africa at Zanzibar

kind of work they do, and the kind of houses in which they live?

Until about two hundred years ago the only people in central and southern Africa were of the black race. Since then many white people have gone there, and have formed large settlements chiefly at the south end of the continent. Central Africa is hot all the year round, so that the natives do not require heavy clothing or fires to keep themselves warm, and their homes need not be anything more than grass huts or cabins to give shade and keep off rain (Figs. 34 and 69). Not only have these people black or very dark skin, but they have also woolly or crinkly hair, broad flat noses, and very thick lips. The little folks are bright and playful, with twinkling black eyes, white teeth, and heels that can scamper over the sand and grass at a lively rate. While their fathers are away hunting the elephant and lion, or at war with some neighboring tribe,

and their mothers are taking care of the cattle, hoeing corn, weaving cloth, or cooking, the children are gathering a few roots or wild fruits for supper, or playing around the huts with small bows and arrows and other rude toys.

At one time the only people in Australia were black people. They were very rude in their habits and slow to learn. Very few of them are now left, and whites make up nearly the whole population of that continent.

For many years bad men carried on the slave trade. They made raids on the villages of the black people in Africa, took men, women, and children away from their homes, and sold them as slaves to the white settlers in America and elsewhere. The sufferings and sorrows of these poor people in being taken prisoners, and the abuse they received in their long voyage over the ocean and during the remainder of their lives of slavery we can hardly realize. Only about forty years ago, after a severe war, those in the United States were given their freedom, and since that time they have been slowly improving in education and culture. In the days when slavery existed there many Negroes made their escape to Canada, where they at once became free. Nearly all the "colored" people of Canada are either liberated slaves or are children or grandchildren of liberated slaves. Some of them can tell interesting stories of slavery days. Now slavery no longer exists among civilized nations, and Great Britain maintains vessels and men to intercept Arabs and other slave-traders, and to set free the poor captives they have taken (Fig. 70).

Now let us visit the homes of the Chinese, who live in China, a country in the east of Asia. There the people have yellow skins, eyes more slanting than ours are, and long straight black hair which the men wear in a *queue*, or long braid, hanging down their backs (Fig. 71). The greater part of their country is warmer than Canada, so their clothing is made of light material and seems very odd to

FIG. 71—A Chinese Family of the Mandarin or Upper Class

us, especially their loose coats and cloaks with sleeves which serve as pockets, and their cotton or silk shoes with thick white felt soles. The richer people live in houses that are well built of wood or brick, while the poorer classes must be satisfied with those of mud or straw. The little Chinese boys and girls, rich and poor, are very respectful to their parents, and those of the laboring class give good help in planting rice in wet ground, gathering leaves from the tea bushes on the hillsides, and feeding the chickens, geese, ducks, and pigs, which are kept around their homes. The chief lessons they have to learn are reading and writing. Each word in their language is written as a separate letter or picture, and hundreds or thousands of these must be learned (Fig. 72).

FIG. 72
"Good Morning" in Chinese Characters.

FIG. 73—Chinese Lady's Foot. Notice how her toes have been turned in from bandaging when young.

This is much harder than learning to spell, is it not? The wealthier people think it very inelegant for ladies to have large feet, so they bind the feet of their little girls, and keep them so for several years (Fig. 73). The children suffer much pain, and when they are grown up their feet are so small and deformed, that they cannot walk well. But the little folks find time to play, and a merry lot they are with their kites and paper dolls, their queer-looking play-houses, and their tame rats and mice.

There are yellow people living in Japan, the islands off the east coast of Asia. They are much more progressive and better educated than the Chinese, and during the last fifty years have become a powerful nation. When the children see a person newly arrived from Canada they think he is very large and without good manners, because the Japanese people are smaller than we are, and are perhaps the most polite people in the world. If we were there little Juzo would be only too glad, after school is over for the day, to take us through his home and show us the things in it, and over the town to show us the strange sights. His father has straight black hair, cut short like that of the men in our country. His mother paints her face white and her lips red, and carefully braids her long black glossy hair and fastens it up with fancy wooden pins. All the people wear loose robes, sometimes of red and blue

silk, which give them a gay appearance. As polite as Juzo is, he does not offer us a chair when we go into his home. There are no chairs in that country. The people sit on mats or rugs on the floor, and at meal time gather around dishes of rice, fish, vegetables, fruit, and tea, placed upon small low tables. In our walk about the town we notice that the houses are built mostly of bamboo, with wide eaves, and sliding doors and windows, and are surrounded by beautiful flower gardens. In the workshops silks, paper parasols, fine porcelain, and other fancy articles are made, and in the stores the goods are arranged on the floor, and customers are given a cup of tea before they make their purchases. On the streets the farmers are bringing in their loads of rice and tea leaves, drawn by oxen or small horses, and ladies are taking pleasure drives in their *jinrikishas*, or light two-wheeled carriages drawn by men. Peddlers carry their wares around (Fig. 75) and many children are playing on the streets. Some are flying kites and others are walking on stilts, and we see

FIG. 74—A Group of Japanese Girls

FIG. 75—Japanese Fruit and Vegetable Peddlers

FIG. 76—Japanese Girls sleeping on a wooden pillow

several little girls romping around with young babies tied upon their backs. Their fathers and mothers are very good to them, provide them with all kinds of toys and games, and in every way possible try to make them happy. When Juzo comes home and has his supper, he has a good bath in hot water, then he wraps himself in a comfortable padded quilt, lies down upon the floor, puts his head upon a small cushioned wooden stool, and goes to sleep for the night (Fig. 76).

It would be pleasant if we could also visit the ice or bearskin huts of the people of Greenland (Fig. 34), north of North America, learn how busy the people are, hunting and fishing, and hear the merry shouts of the boys and girls as they go sliding down the snowy hillsides. It would also be pleasant to visit the bamboo houses of the Malays in the south-east of Asia, to watch them growing coffee and spices, and to see

FIG. 77—Indians in the northwest of Canada, with Wigwam

how happy the little folks are as they climb trees for nuts and fruit, or swim in the cool waters of the rivers and lakes of their island homes.

There are many different kinds of people in the world. Some are white like nearly all of the people of Canada, some are black like the Africans, and others are yellow, copper-colored, or brown, like the Chinese, the Indians (Fig. 77), or the Malays (Fig. 78).

FIG. 78—Natives cleaning rice kernels in Marinduque, Luzon, Phillippine Islands

People, like the blacks of central Africa and Australia, who are rude, uneducated, and uncultured; who live by hunting, fishing, and gathering wild fruits; who are often at war with one another; and who worship idols which they make for themselves, are called *savages*. In what ways do we differ from savages? People, like the Canadians and the white race generally, are said to be *civilized*. Many of the yellow and brown people, not as wild as the Australian blacks, nor as cultured as the Canadians, are said to be *half-civilized*.

QUESTIONS

1. From what materials did Canadians build their houses long ago? What places did they usually select in which to build them?

2. From what do we build our houses to-day?—in the country?—in the city?

3. Where do the greater number of people live?—in the mountains, in the valleys, or on the plains?

4. By what name are Indian babies known?—Negro babies?

5. Compare white, black, and yellow people with respect to their hair, nose, lips, eyes, clothing, occupations, and the different parts of the world in which they live.

FARMING AND STOCK-RAISING

Let us now consider for a little while the principal occupations of the people of Canada.

The most important occupation in our country is Farming. There are some places where many people depend upon fishing, mining, or lumbering, but even there they need farm products for food—wheat, fruits, beef, pork, milk. When the farmer's crops are poor the whole country suffers, but when crops are good every class of business flourishes.

Part of the work of the farmer consists in ploughing, harrowing, cutting hay, sowing, reaping and threshing grain, planting and gathering root crops, and drawing the produce of the farm to market. He must consider well the kind of crop he wishes to cultivate upon any part of his farm. Where the land is low and moist he grows good hay, and his meadows supply food for cattle and horses; where the land is not so wet, and the soil is good, he sows his wheat, oats, and other grains; in a more sheltered part of his farm he plants an orchard, in which he raises apples,

FIG. 79—Western Farming Scene. Cutting Wheat

pears, plums, cherries, and peaches. If his farm be in a warm valley he may raise little else upon it than fruits; if it be near a large city it may be really a garden in which he grows only market vegetables.

FIG. 80—Farmyard Scene, Ontario

The arrangement of crops on a farm we see repeated on a much larger scale all over Canada. The broad prairie land in western Canada, where the soil is rich and the rainfall moderate, is one of the chief wheat regions of the world (Fig. 79). In the warmer portions of the Dominion in the south-west, south, and south-east, there are many splendid fruit farms producing abundance of apples (Fig. 46), peaches, grapes, and other fruits.

A visit to a farmyard is always pleasant (Fig. 80). Name some of the animals that may be seen there. Perhaps the most useful one is the cow. For what different purposes do we use her milk, flesh, hide, hair, bones, hoofs, and horns? Describe in a similar way the uses of the other farmyard animals you can name.

In Canada, just west of the grain region, there is a broad section of country that does not receive rain enough for successful grain, hay, or fruit farming. It is given up to the herding of horses, cattle, and sheep. The great areas over which the animals are allowed to roam are called *ranges* or *ranches* (Fig. 81), and the men whose business it is to look after them are called *cowboys*. The cowboys, mounted on fleet-footed ponies, collect all the cattle of their ranch generally twice a year in a great *round-up*, first to brand or mark the calves that belong to their herds,

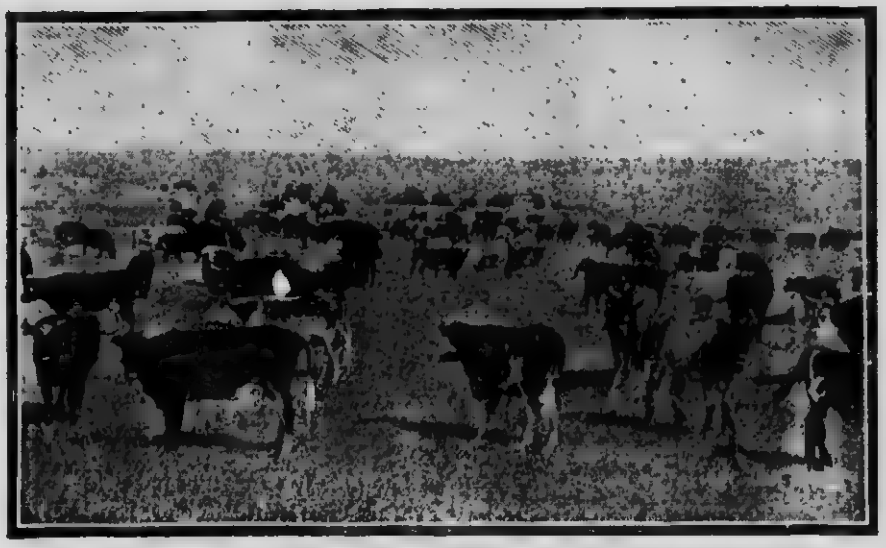


FIG 81—Ranch Scene, High River, Alberta. Why is the climate dry here?

and later to take out those animals suitable for shipment, and then allow those left over to run free again. Find out how the cowboys catch the cattle they wish to brand. In what do you think consists the chief value of the animals herded upon Canadian ranches?

QUESTIONS

1. What kinds of work are done by the farmer's boy, the farmer's girl, and the farmer himself?

2. What are the principal crops raised by the farmers near your own home?

3. Describe the various features of a good farm.

4. How do farmers raise good crops in some countries where it scarcely ever rains?

5. What advantages has the farmer's boy or girl? Where would you prefer to live, in the city or in the country? Why?

6. Why are cattle on ranches very wild? Do you think the cattle on our farms would become wild if turned loose upon the ranches?

7. Why are flocks of sheep guarded more carefully than herds of cattle or horses?

8. What is the natural food of the pig? By what names are different parts of its flesh known?

9. Describe various ways of preserving meat.

LUMBERING

The vast forests in the western and eastern parts of our country give rise to the great lumbering industry.

In the beginning of winter, large gangs of men and horses gather together at the "shanties," or lumber camps in the forest. Among them are many of the farmers near where we are living, who have left their farms to the care of their wives and daughters, while they and their sons have gone with their horses to the forest for the winter's work (Fig. 82). A lumberman, who owns the timber growing upon a certain section of the great forest called a "timber limit," has hired the men to cut down trees, saw them into logs, and haul them by means of horses to the bank of the river. This work goes on all winter, and thousands of logs are piled up ready to be floated down the stream after the ice thaws in the spring. Many men also are employed in drawing to the lumber camps supplies of salt pork, beans, flour,

FIG 82—Lumber Camp near Klock, Ont.

FIG. 83—Rolling Logs into the River

molasses, hay and oats, to be used as food for the shantymen and their horses. The shantymen and the drivers are generally dressed in warm woollen clothes, with woollen or fur caps, woollen or leather belts, and moccasins. Can you tell why they dress in this way?

In the spring many of the men return home, and a smaller number work throughout the spring and summer with the logs. They stamp the owner's mark deep into the ends of the logs, and roll them into the river (Fig. 83), upon which they float in thousands out of the forest. About once every week a small boat containing four or five men is rowed down stream, and any logs that have been stopped along the shore are pushed out into the middle of the river.

When all the logs piled on the bank during the winter have been started down the river, a gang of thirty or

forty men stretch a *boom*, or line of light logs with ends chained together, across the river, attach row-boats to the ends of it, and draw it down the stream, driving all their logs before them. Their work is often dangerous, and many a man in running over the logs loses his footing and drops into the water; but seldom is one drowned, for

FIG. 84—Logs floating in the river near Three Rivers, Que.

most of them are good swimmers. For the remainder of the season the river is clear of logs.

Sometimes when the river is very large the logs are enclosed within a circle of lighter logs chained together, and the whole is then towed down stream or across small lakes by a steamer. Square timber is bound strongly together into *cribs;* when a number of cribs are joined together, they form a *raft* (Fig. 86). Often there are waterfalls and rapids so rough that the logs would be split and otherwise damaged in passing over them. To prevent this, *slides*, or huge troughs, are built around the

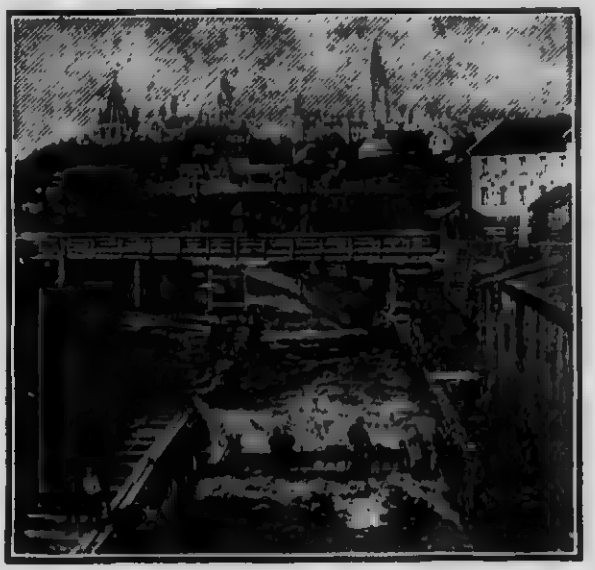


Fig. 85—A crib of timber passing down a slide at Ottawa

rapids, and the logs or cribs are carried down by the smooth swift current at a very rapid rate. Some of these slides are only built for single logs, while others are large enough to take in whole cribs at a time (Fig. 85). A ride on a crib of timber down a slide is as exciting as coasting or tobogganing. Where the stream is smooth and broad the cribs are usually bound together into large *rafts*, sometimes covering an acre or more of water (Fig. 86). Often the men have one or more cabins on the raft where they sleep and get their meals during their journey.

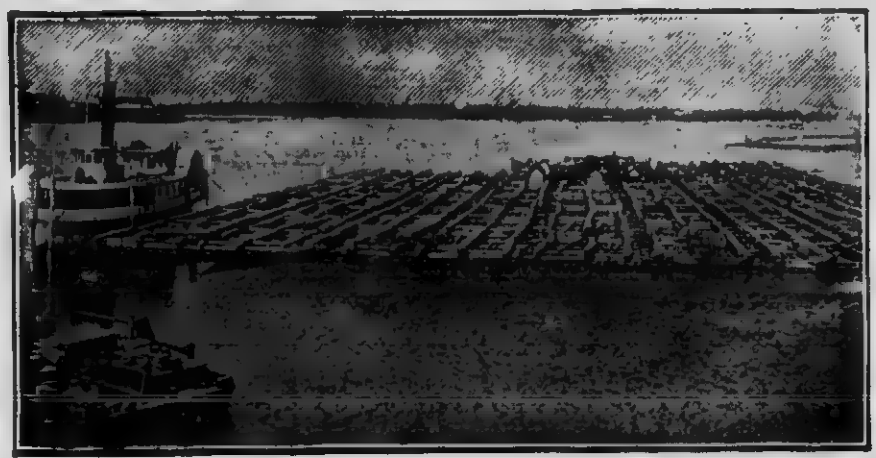


Fig. 86—Raft of timber, made up of cribs, and containing cabins for the men in charge

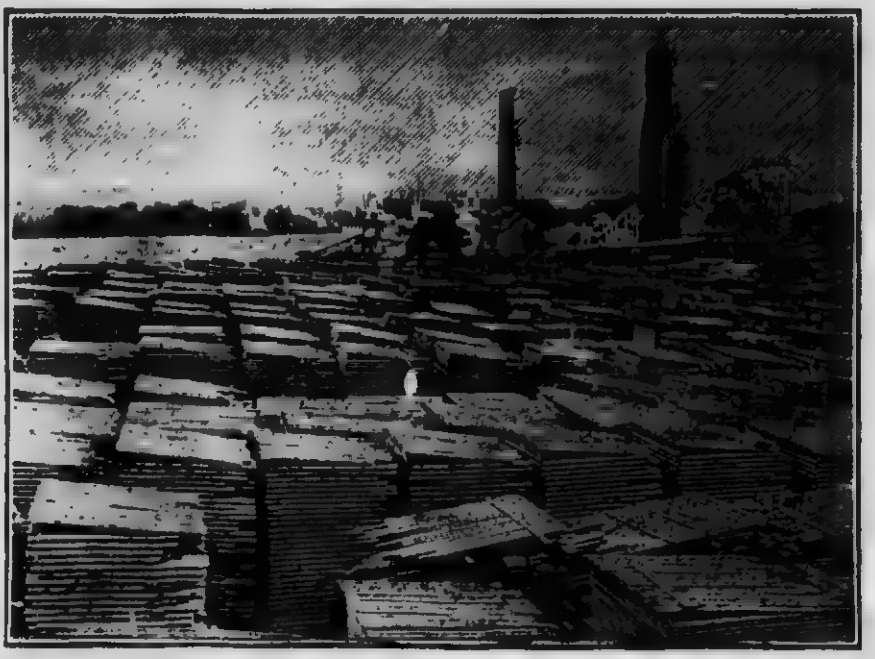


FIG. 87—Sawmill and lumber-yard, Rockland, Ont.

In both western and south-eastern Canada the logs are brought to great saw-mills, enclosed in a boom, and afterwards sawn into lumber (Fig. 87). At some of the cities the lumber prepared in the mills is placed on board large vessels and carried across the ocean to other countries.

While most of the trees, when felled, are cut into logs, which are then sawn into lumber, still a great many of the straightest and best trees, and generally all those we call hardwood, such as oak and elm, are not cut into lengths. These are squared, that is, trimmed to make them square instead of round. They are then floated down in the same manner as the logs, some to be made into beams and other heavy timbers; but a large part is brought in rafts to the seaport cities, where it is shipped on board large vessels to other countries. The finest and straightest of all are not squared, but are used for masts of ships; and many smaller ones are used for telegraph poles.

In some parts of the country railways have been built to the lumber camps, and logs are taken away, and provisions are brought in, by trains. This is a much quicker way of doing the work than by horses and by floating the logs down the rivers.

QUESTIONS

1. Trace the history of any piece of timber or lumber in your house.
2. Why do we paint the wood of our houses, furniture, and fences?
3. Name some trees from which lumber is obtained. What kind is chiefly used?
4. In what ways are forests useful? Why should we be careful of them?
5. What is done with the logs which the lumberman takes from the Canadian forests?

MINING

Of what substance are stoves made?—A twenty dollar piece of money?—A twenty-five cent p ce?—A one cent piece? Name as many other uses as you can to which each of these four metals is put. Name three other common metals. Which is the heaviest metal you have seen? Which is the lightest?

All of the substances you have named we get out of rocks. Deep and large openings, called *mines*, are made in the earth by *miners*, and the *ore*, or rock containing the metal, is brought to the surface, where the pure metal is extracted from it. Any rock, or substance which forms part of a rock, we call a *mineral*.

Name any articles in your home or in your school-room made entirely or partially of iron. Name half a dozen iron or steel tools used in wood-working—in the garden—in your home. What are some of the uses of iron in house-building—on railways—on the sea—in warfare? Name some iron machines. How do you think we should be able to get along if we had no iron?

For what purposes do we use coal? It has been formed in the earth during the course of thousands of years, from the remains of trees and other plants. The two most common varieties are "hard coal" and "soft coal."

Hard coal is quite hard, like stone, has a black shiny surface, and burns with very little flame. It is mined in large lumps, and the lumps are taken to buildings called *breakers*, crushed between heavy iron rollers, and assorted into the various sizes of coal which we can buy. Find out the names of some of the common grades of hard coal.

Soft coal is more easily broken than hard coal, and is duller in color. Soft coal is used in furnaces for steam-

FIG. 88—The Mines, Tipple Buildings, and Coke Ovens at Michel, B.C.

boilers, steamships and locomotives. It is often used also as fuel in grates, where it burns with a bright cheerful blaze. When it is roasted in large iron retorts, ordinary *coal gas*, so much used for lighting and heating purposes, is driven out of it, and what is left is a useful fuel called *coke* (Fig. 88). Find out which kind of coal the blacksmith uses in his forge, and which is used on railway engines in our country. Which kind gives out the greater amount of smoke in burning?

One kind of iron ore is a black heavy rock, and others are reddish, yellowish, and gray. To obtain iron from the ore the latter is mixed with coke and limestone in *blast furnaces* (Fig. 89), which are like tall towers, and there heated until the whole is melted, and the metal being heaviest, sinks to the bottom. Then when thoroughly melted it is allowed to run in a stream out of a vent-hole in the bottom of the furnace into short troughs moulded in sand, where it cools into bars called *pigs*, forming *pig-iron*.

This process is called *smelting*. From pig-iron the various forms of steel, wrought iron, and cast iron are prepared.

Name the gold coins used in Canada. How does gold compare in value with other metals? Why is it so valuable? What are some of the qualities of gold?

Gold is found in fine grains in the sand along the banks or the bottoms of many rivers, and also embedded in rocks. The miner calls the gold-bearing sand or mud "pay-dirt," and any lump of gold a "nugget." There are several

FIG. 89—Blast Furnace at Sydney, C.B. The reason this furnace is situated here is because the iron-ore and the coal are here found near together

different ways of obtaining pure gold, a common one being by washing pay-dirt, or crushed gold-bearing rock, with water, so as to carry away the sand, and leave the heavier gold. This is done in British Columbia on a large scale, by means of very powerful streams of water directed against the hillside, through a tube which resembles a gigantic hose (Fig. 90).

What silver coins are used in Canada? Gold and silver are called the "precious metals." Why?

For what purposes are limestone, granite, and sandstone used? Pits where rocks are dug out of the ground are

called *quarries* (Fig. 91). What are some of the uses of marble, stone, and mica?

Not all minerals are solid. Petroleum, from which common coal oil, benzine, vaseline, and many other substances are obtained, is a dark-colored liquid pumped from wells which are sunk deep down into the ground. Natural gas, resembling coal gas, rushes with great force from deep borings in the ground. Salt is often found dissolved in water, and is obtained by sinking wells, pumping out the brine, and evaporating it in large shallow trays or pans. In some parts of the world, however, a solid form of salt called "rock salt" is dug or quarried out of the ground, like coal.

The life of the miner is not an easy one. The country in which he lives is generally mountainous, rocky, and

FIG. 90—China Creek Hydraulic Mine, Cariboo Mining Division

FIG. 91—Stone Quarry at Credit Forks, Ont.

desolate. Coal mining is very dirty work, and the miners soon become grimy with coal dust. Mines deep in the ground are very hot and dark, and in spite of modern methods of ventilation have air that is often impure. The gases which form in coal mines, when mixed with air, become highly explosive, and often scores and hundreds of workmen are killed by an explosion of what is called "fire damp," sometimes caused by the careless exposure of the flame of the candle or lamp carried by each miner.

Canada is one of the richest mining countries in the world. No doubt you have heard of the gold of the Klondike. That region is in the extreme north-west of Canada, but the mountainous country all along the Pacific coast, and some smaller areas in the south-east of our country are rich in gold. Iron is found in the mountainous parts both in the east and west, and coal abounds in many sections of the country. You will some day study more definitely the location of many minerals in Canada and in other countries.

QUESTIONS

1. In what different ways are rocks useful to us?

2. Which do you consider the most useful metal? Which the most useful rock?

3. Are the common metals and rocks found generally in mountainous or in level country? Do you think any could be found under the soil of the valley?

4. All the minerals named in this chapter are found in Canada. Which are metals? Which are rocks? Which are minerals that are not solid?

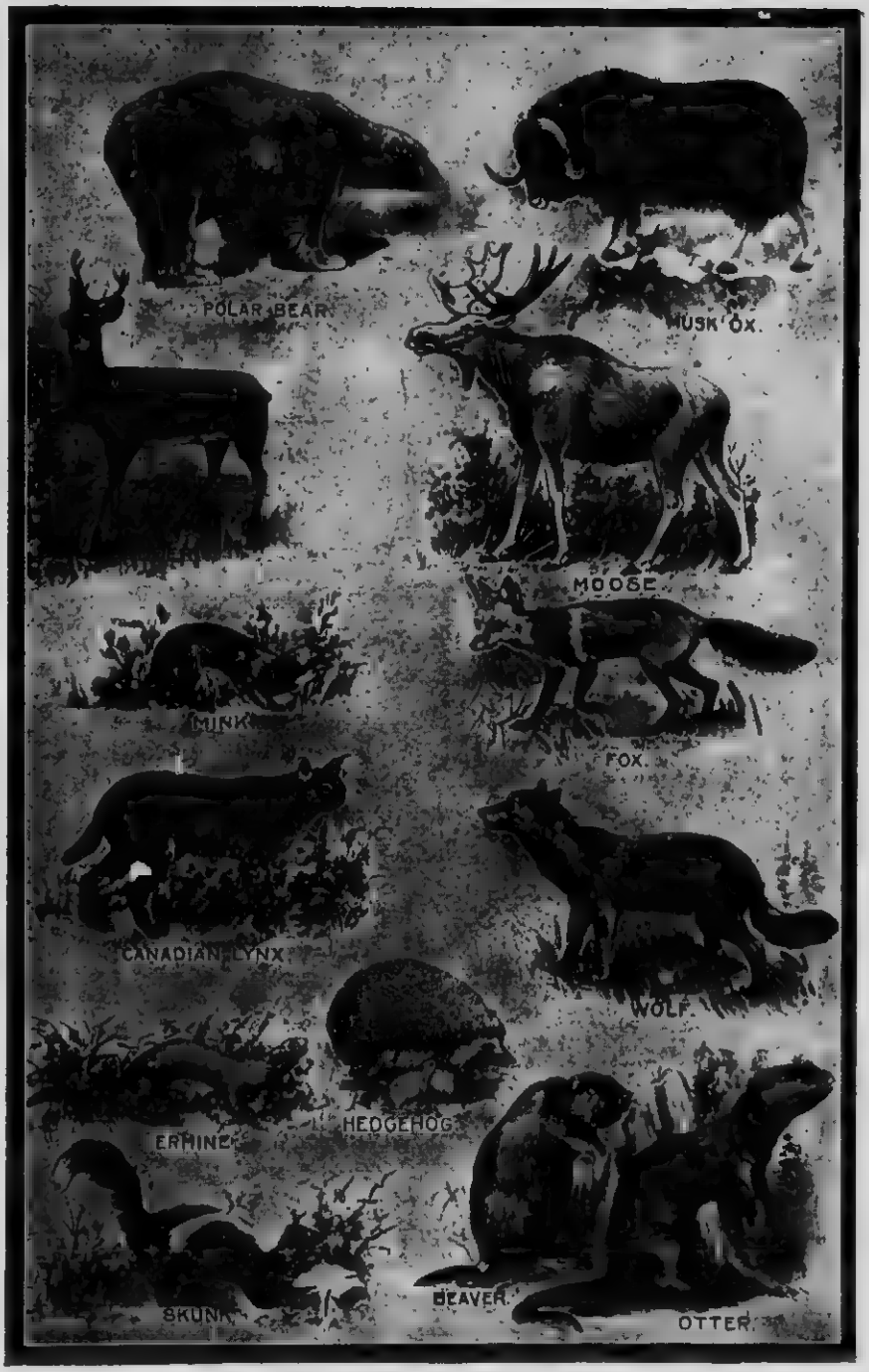


FIG. 92—CANADIAN WILD ANIMALS

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FIG. 93—Trading with the Indians at a Hudson's Bay Co.'s Post

FUR-TRADE AND FISHERIES

The forests of Canada are full of wild animals of many kinds. Bears, deer, wolves, foxes, otters, mink, and many other fur-bearing animals (Fig. 92), are common, and partridges, ducks, quail, and other wild birds, many of which are useful for food, are also very numerous. You already know that the Indians at one time easily obtained by hunting and trapping all the meat and furs they needed, and that the French people, who at one time owned Canada, carried on for many years an extensive trade in furs. The furs were sent to Europe, where they were in great demand, and brought high prices. Companies were formed to carry on the fur-trade, the largest of which—the Hudson's Bay Company, founded nearly two hundred and fifty years ago—has existed to the present day. Although the fur trade is not as great now as it once was, it is still important, and valuable shiploads of furs are sent to Great Britain every year. The Indians of the

North and North-west make a living by hunting and trapping; and the furs they obtain they bring to the stores or trading-posts, and exchange them for blankets, flour, guns, and other articles (Fig. 93).

As a result of reckless hunting, many of the wild animals have nearly disappeared, such as the beaver, once very numerous, and the buffalo, which formerly roamed over the prairies of Canada, and of which only a few specimens, carefully guarded, now remain (Fig. 68). The laws of our country do not allow men to hunt deer and other useful wild animals whenever they may choose. Deer may be hunted for a short time each autumn, and even then, each man is allowed to take only a small number of them. But what are known as "noxious," or harmful animals, such as the bear, wolf, lynx, or fox, may be hunted at any time. In some parts of Canada large

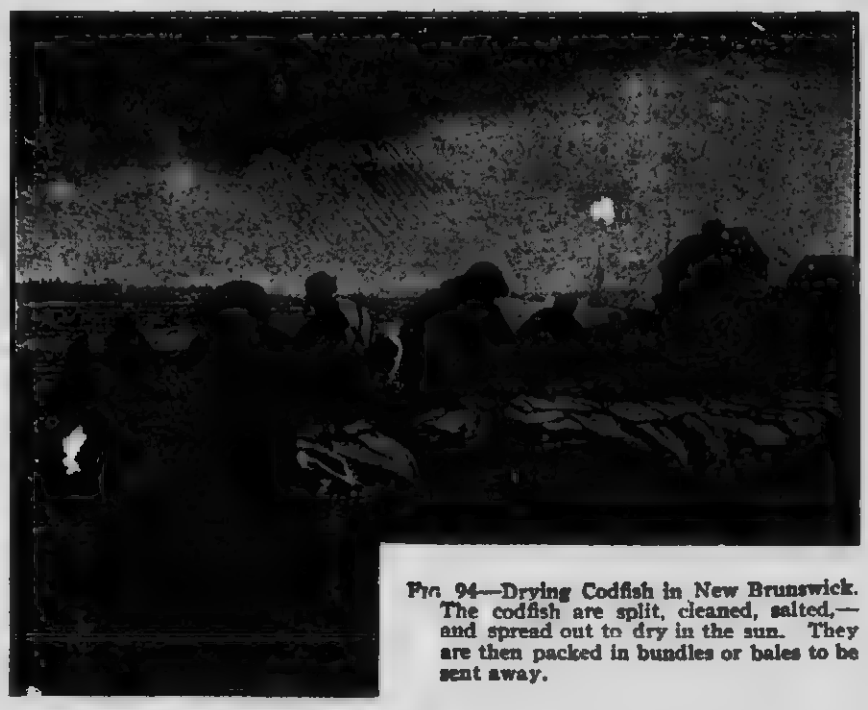


Fig. 94—Drying Codfish in New Brunswick. The codfish are split, cleaned, salted,—and spread out to dry in the sun. They are then packed in bundles or bales to be sent away.

tracts of country, called "National Parks," are reserved for the purpose of protecting "game" from utter destruction. In them no hunting or shooting is ever permitted. Name some wild animals that are useful for food; also some from which we obtain fur. Can you describe any of their habits, or where they are found?

Have you ever gone fishing? If so, what method of catching fish did you use? What kinds of fish are taken in the waters near your home? When you go into a grocery-store or fish-market, find out the different kinds of fresh fish, salted fish, dried fish, and canned fish sold there. Examine the labels of the canned fish, and state where they are obtained. The merchant will tell you where the other kinds come from.

Many methods are adopted for catching fish. Codfish are generally taken by means of hook and line, like yours, but each line carrying as many as twenty-five or fifty hooks. Mackerel and herring, which come in *shoals*, or swarms, are enclosed in *seines*, or very long nets, the fishermen in their boats gradually drawing the ends of the net together. Some fish are caught by the gills in *gill nets*, long nets which hang in the water and are supported by small floating buoys. The larger fish only are caught, while the smaller ones swim through the meshes. Lobsters are taken in what are called "pots"—wicker baskets,—open at both ends, one wide, the other narrow, several fitted one into the other, so that the fish easily enter, but are unable to find their way out. Can you find out why wicker traps, and not nets made of cordage, should be used for lobsters?

Many thousands of hardy fishermen are employed in the Canadian fisheries, catching fish, and drying, salting, canning, and otherwise preparing them for market. The

FIG 95.—Scow-Load of Salmon, British Columbia

value of their boats, nets, and other outfit is reckoned in millions of dollars. The largest fisheries of Canada are on the coasts of the Atlantic and Pacific oceans, in the bays and river-mouths, and also at distances of hundreds of miles from land. The chief fish taken in the Atlantic, are cod, herring, mackerel, and lobsters, and on the Pacific coast, salmon (Fig. 95). At certain seasons of the year the salmon leave the salt water of the ocean, and swarm up the rivers in such great numbers as to actually impede the flow of the water in the more shallow places. Why should these be good localities for canning establishments? Our large inland lakes are well stocked with whitefish, salmon-trout and sturgeon, and catching these affords employment to a great many men.

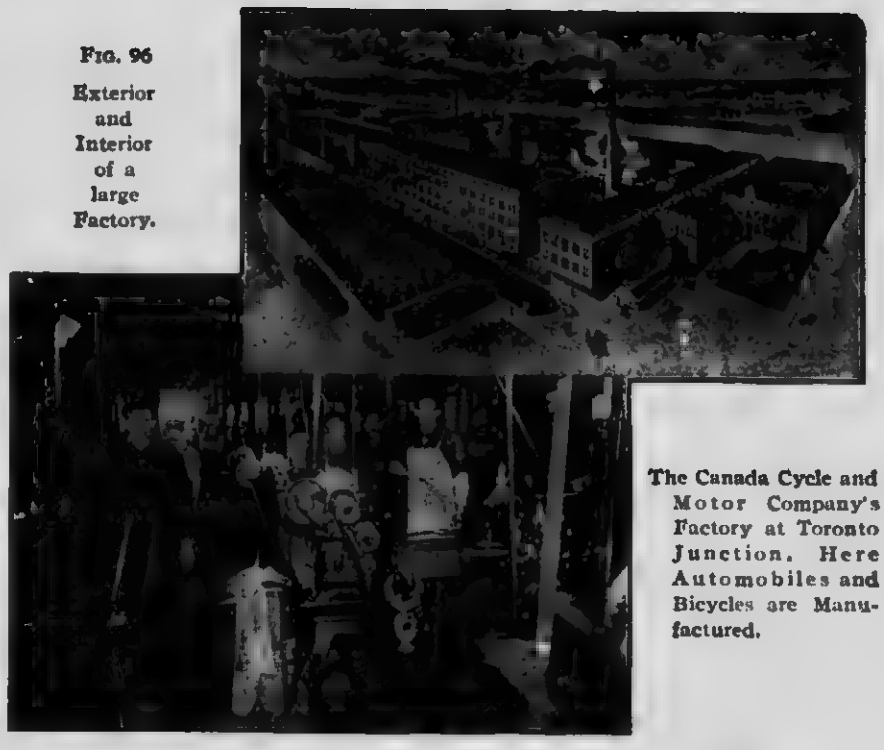
The fisheries of Canada are an important source of wealth to our country. It may surprise you to learn that a greater value of fish is sent from Canada to other countries, chiefly Great Britain and the United States, than there is of cattle and sheep, although that is very large.

QUESTIONS

1. What wild animals were hunted many years ago near where you now live? Are any hunted there now?
2. Name the chief wild animals of Canada that provide us with fur or food.
3. Describe some of the different ways of capturing wild animals.
4. Try to find out what we obtain from the whale.
5. Describe as many methods of fishing as you can.
6. Name as many kinds of fish caught in Canadian waters (river, lake, or ocean) as you can.

Fig. 96

Exterior and Interior of a large Factory.



The Canada Cycle and Motor Company's Factory at Toronto Junction. Here Automobiles and Bicycles are Manufactured.

MANUFACTURING AND COMMERCE

In every large village, town, or city there are men who *make* many things to sell, such as clothes, shoes, flour, bread, tinware, horseshoes, waggons and sleighs, and woollen cloth. Sometimes a large factory, in which hundreds of men work, is built in a town or city, where are made such articles as house furniture, farm implements, carpets, carriages, and steam engines (Fig. 96). All these kinds of work are classed under the general name—*manufactures.* Name as many manufactures as you can that are carried on in the village, town, or city in or near which you live.

Shoemakers, tailors, and other small manufacturers set up their business wherever they can get custom for what

they make, for they supply local demand and do not send their goods very far away. Large factories are established where the material they require can be easily obtained, and their products readily shipped away. Some sugar factories are built where beets can be profitably raised; cement factories where there is abundance of suitable clay; steel works where iron and coal can be easily brought; and lumber mills where the proper kinds of timber are near by. Why do large manufacturers prefer to establish their factories in towns or cities which are entered by several railways or which have good harbors?

The occupations already described are all connected with the natural products of our country. But many people are busy with work that is necessary, although it cannot be called productive. The physician, the clergyman, the teacher, the lawyer, and men of other professional duties are needed, almost, if not quite, as much as the farmer, the lumberman, or the miner. Then we have in our country thousands of people engaged in commercial work—clerks, sailors, railway-men, telegraphers, and many others.

Many years ago when our country was first settled there were no carpenters, shoemakers, tailors, nor blacksmiths, and there were no flour mills nor woollen mills. People at that time had to build their own houses, make their own shoes and clothes, repair their ploughs and ox-carts, grind their own wheat, and card, spin, and weave their own wool. The Indians also built their wigwams, sewed together their fur clothing, made their bows and arrows, went fishing and hunting, and raised their corn.

But as people increased in numbers they began to divide up the various kinds of work, and each man did what he most liked to do. One man spent all his working hours making chairs, tables, and other furniture for the houses;

another built a flour mill, ground the wheat brought to him by his neighbors, receiving as pay his *toll*, or small share of the wheat or *grist* brought by each man; another man made shoes; and so on. Then it was that people began to depend upon each other for food, clothing, and shelter. The carpenter and miller exchanged chairs for flour, and the shoemaker and tailor exchanged shoes for clothes. Even the Indians entered into this system of exchanging (*trading*, or *bartering*), and brought to the settlements furs of different animals, baskets, and other articles, and received in return fire-arms, powder, and blankets (Fig. 93). Which do you think is better, to know one thing well, or to know many things partially?

Trading one kind of article for another was not always convenient, but money was scarce and people had to do the best they could, and it took some time before money came into general use. In the very early days it consisted often of small shells and beads; but afterwards gold, silver, and copper coins were made, very much like those in use at the present time. What advantages has the use of money over bartering? To-day besides coined money we have also paper money, or what is commonly called "bills"—a kind that is much more easily carried and handled than large quantities of silver and gold coin. The value of paper money is due to the fact that the government or bank which sends it out promises to pay in coin the amount mentioned on it. The next time you see a bill, look over it carefully, and you will find printed on it a promise to pay a certain sum of money (or coin) to the bearer, that is, to the person who has the bill, at any time whenever he may ask for it.

Have you ever visited a country store? Sometimes it is built near a railway station, sometimes near a new mine, sometimes at a cross-roads in a farming country.

Why are these locations good for a store? The farmers in the neighborhood bring their butter, eggs, chickens, potatoes, or apples; and exchange them for sugar, tea, cloth, and other articles they need in their homes. What other articles may the farmers bring to the store? If your home is near a country store, state why the store was placed where it is. Often a store of this kind is also the post office and the telegraph office, and many people have occasion to come to it. Soon other buildings are put up near it, small tradesmen open up their shops, private residences are built, a school house and a church or two appear, and a village is formed. If the village have such advantages as a good location on a railway, good water power, a good harbor, prosperous country surrounding it, or enterprising citizens, it will probably grow to be a town, and finally a city with busy factories, many railways, and all the noise and bustle of extensive business. Try to find out why your city or town has become large, and upon what its prosperity chiefly depends. Why was it built where it is?

Have you ever thought of where the people of a great city obtain their supply of food and water? They do not raise crops, and in large cities do not dig wells. All, or nearly all, their supplies must be brought in from outside. The country close to the city nearly always has many small farms on which market vegetables and fruits are raised with the greatest care. Milk is sent in by the car-load from points sometimes twenty or thirty miles from the city, and supplies of meat may come from stock farms and ranches hundreds of miles away. Water is usually brought into the city by means of great iron pipes from lakes and springs, sometimes from a distance of many miles, and then distributed amongst the homes by pumping machinery.

Thousands of years ago people were not long in finding out that they could travel on water by means of rafts and canoes. The Indians of our country made light and handsome canoes out of birch bark and cedar wood, and travelled rapidly over the rivers and lakes (Fig. 97). People of other countries learned to make large ships which held many people, and in them they travelled long distances. At first they did not venture very far from land, but as time passed on they improved the vessels, and became bold enough to sail across the ocean and visit distant lands. There they found new kinds of products, and at once trading began, the sailors taking fruits, weapons, ornaments, and other goods of the new country in return for beads, hatchets, and other articles which the natives gladly received. Exchange of goods between distant countries then rapidly grew, until at the present time it can scarcely be measured. The merchants of every large country now sell to people in other lands, and also buy from them, millions upon millions of dollars' worth of goods. This buying and selling of goods is called *Trade*, or *Commerce*. If the goods pass from one country to another, the exchange is called *Foreign Commerce*, and if they go from one part of a country to another part of the same country,

FIG. 97—Indians in Birch-Bark Canoes

Domestic, or *Internal Commerce*. Goods sent away from a country are called *exports*, and those brought in, *imports*. Generally the goods which are bought and sold between different countries are what the purchasers cannot get at home, and what the sellers can spare. Canadians have much more timber, raise more wheat, and make more butter and cheese than they use, so they have large quantities of these to export, or send out of the country; but they must import, or bring in from other countries, oranges, bananas, silks, and many other articles not grown nor made in Canada.

The nature of the roads of a country shows pretty well the extent of inland trade of that country. Long ago people travelled through Canadian forests along "blazed" paths, that is, paths marked by notches cut in the trees. At a later date trees were cut down, and "corduroy," or log, roads made across swamps and muddy places, over which waggons and carts were drawn by oxen. As business increased the roads were improved, and horses took the place of oxen (Fig. 98). With improved roads bicycles have come into use; and automobiles, or horseless carriages (Fig. 99), which can travel at a great speed, are becoming quite common. How

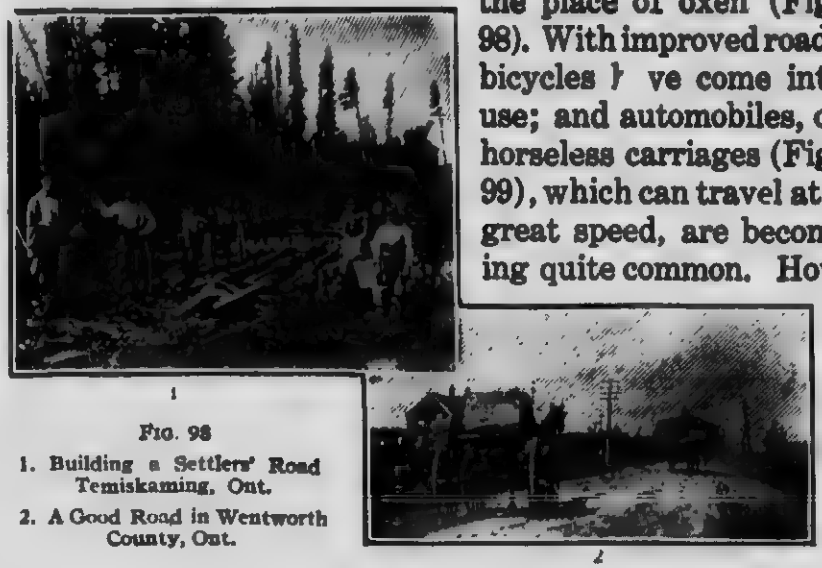


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FIG. 98

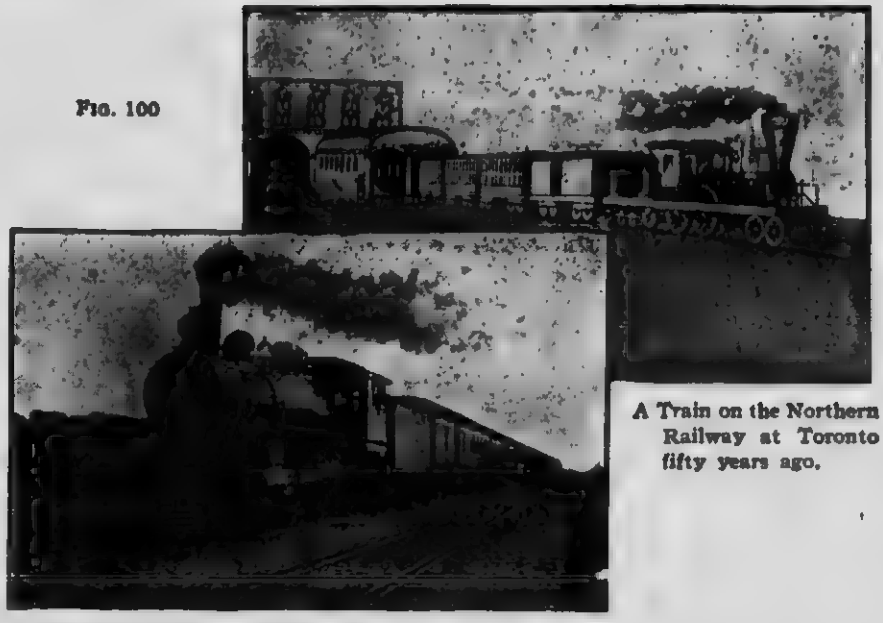
1. Building a Settlers' Road Temiskaming, Ont.
2. A Good Road in Wentworth County, Ont.

Fig. 99—The Russell Automobile, (a horseless carriage)

do men improve the roads near your home? In many foreign countries to-day, in Asia, Africa, and South America, the roads are mere bridle paths or trails, and in those countries trade is comparatively small. State how people travel where there are few roads (Fig. 60).

It is not so very long since railways were first built. Before that time people who wished to travel used the old stage-coach, often drawn by four or six horses, and they thought they went rapidly at ten miles an hour. A journey of a hundred miles occupied at least two or three

FIG. 100



A Train on the Northern Railway at Toronto fifty years ago.

A Modern Train on the Grand Trunk Railway System

days, and a trip across Canada from the Atlantic to the Pacific was impossible. When railway trains first came into use the engines were small, and burned wood for fuel; the carriages were uncomfortable; and the speed they attained rarely exceeded twenty miles an hour (Fig. 100). Now passengers can sit in comfort in luxurious cars, travel over the country at the rate of from forty to sixty miles an hour, and cross Canada from one ocean to the other in four or five days. In the old days freight was hauled over the country in waggons at the slow rate of two or three miles an hour, but now freight trains can carry it ten times as rapidly, and at much less cost.

Canada has also another highway which affords almost boundless means of travelling and carrying heavy loads with ease and little expense—namely the large rivers and lakes in the interior of our country. The Indian found that out in his bark canoe (Fig. 97), in which he could travel from one end of the country to the other, with,

FIG. 101—One of the large lake steamers in the lock of the Sault Ste. Marie Canal

here and there, only a short portage, or place where he had to carry his canoe around rapids or falls. Why did the early Canadian settlers build their homes along the shores of the rivers and lakes? At the present time huge steamships (Fig. 101) carry grain, ore, and other heavy freight upon the great lakes—one steamer being able to carry as much at one time as five railway trains of twenty-five cars each. But steamers, however powerful, cannot go up against swift rapids nor down steep waterfalls

FIG. 102—The Allan Line Steamship Victorian (Canadian). This is the first ocean turbine steamer, and one of the largest vessels aflout

any better than the Indians could in their canoes. To pass such difficult or dangerous places *canals* have been cut, on which are locks by means of which vessels are raised or lowered (Fig. 101).

Your grandfathers and grandmothers will tell you of their voyage from the "old country" to Canada fifty years ago, when they spent six weeks or two months in a small sailing vessel on a stormy sea. Now magnificent ocean steamships, of enormous size and power, make the same distance in less than a week (Fig. 102). These

steamships are so large that it is difficult to form an idea of their vast size, but here is a picture of the funnel of one of them, and if that is so huge, what must the vessel itself be (Fig. 103)?

FIG. 103—A Funnel of the Steamship "Caronia." It is large enough to permit two railway trains to pass through at the same time.

To ship goods readily from place to place there must be certain points in the exporting district where the goods may be collected, and in the importing country from which they may be distributed. These points are generally situated at the mouth of some river, or where many railways meet, or where ocean vessels can load and unload their cargoes. Large cities grow up at those points as the trade which centres there becomes greater. In Canada there are now a number of cities that are important collecting and distributing centres. These are Halifax, and St. John on the Atlantic, Quebec, Montreal, Toronto, and Winnipeg in the interior, and Victoria and Vancouver on the Pacific coast. You will learn at another time why these cities have become trade centres, and the nature of the trade that passes through them.

QUESTIONS

1. What are business men called who buy and sell goods?
2. Name as many causes as possible of the growth of a village, town, or city.
3. Name as many important occupations of the people as you can—in villages—in towns or cities—in the country—in the mountains—on the water.
4. State as many reasons as you can why manufacturing towns are busy and prosperous.
5. What kind of work would you like best to do?
6. In what ways may a river aid in the growth of a town or city?
7. Describe any important or interesting things you have seen in any city. Would you like to live in a large city? Why?

8. What are the sources of food and water supply of large cities?

9. Name several kinds of food, articles in your homes, and materials which may be made into clothing, which come from foreign countries.

10. Name any articles made or raised near your home and shipped to foreign countries.

11. What are the chief means of carrying goods in Canada?

12. Can you think of any ways of travelling that are not referred to or named in this chapter?

13. Do you know any places where stage coaches are used? Why are they used there?

14. What do we mean by collecting and distributing centres? Name some important ones in Canada.

PLANS AND MAPS

We must have some way of describing how long, how wide, or how high any object is, or how far it is from some other object.

In measuring short distances we use the *inch*. Your rule is marked so that the longest lines across it are one inch apart. Each inch is divided into *half inches* and *quarter inches*, and perhaps *eighths* of an inch. How many inches long is your rule? If twelve it is one *foot* long.

Use your rule for measuring, and answer the following questions: 1. What is the length of your pencil? 2. How long, how wide, and how thick is your reader? 3. How long and how wide is the top of your desk? 4. How wide is the sidewalk, if there be one, past your school?

To measure longer distances, the *yard*, which is equal to three feet, is used. Take a long cord and carefully tie small knots on it one foot apart, and double knots one yard apart. With it and your rule determine the following in yards, feet, and inches: 1. How long and how wide is your school room? 2. How long and how wide is the school building? 3. What is the length and the width of the school grounds? 4. How wide is the street or the road past the school?

A general idea of still greater distances may be obtained by pacing. Take a knotted cord ten or fifteen yards long, and pace its length several times. In this way you can find out the length of your step. Then by walking and counting your steps you can measure how far you go. Let a number of boys or girls measure in this way 440 yards;

this is a *quarter of a mile.* Now walk this distance at your regular rate and see how many minutes it takes you. Then, by timing, determine longer distances.

Find by pacing or timing how far it is from your home to the school. How far is it from the school to the post office? Measure in this way other long distances you may select.

FIG. 104—A class room in King Edward School, Toronto, Ont.

On this page a picture of the inside of a school room is shown (Fig. 104). Name some of the things you see in it. On the following page a plan of the same room will be found (Fig. 105). What are some of the things shown in the plan? What can you find in the picture that is not in the plan? In the picture everything appears just as it would to a person standing at one of the doors and looking into the room, but in the plan only the posi-

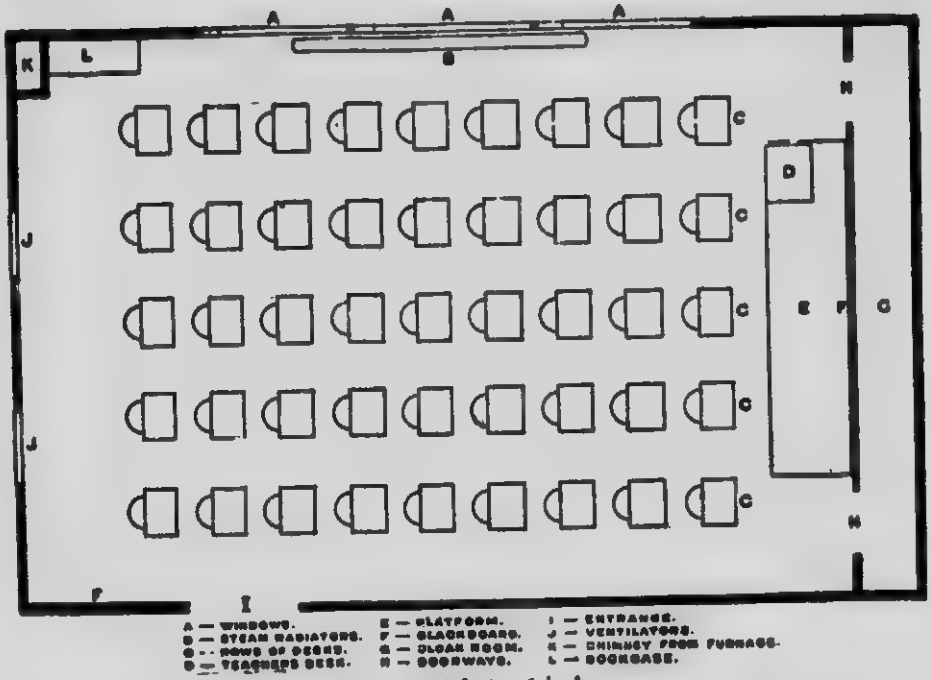


FIG. 105—A Map of Fig. 104 with index to objects in the room

tions of the objects on the floor and their directions and distances from one another are shown.

The room is forty feet long and twenty-five feet wide. How many inches long is each side in the plan? What part of an inch in the plan represents one foot in the room? This is known as the *scale* to which the plan is drawn. All plans must be drawn to a certain scale; otherwise they do not correctly represent what is being shown. The scale of this plan of the school room is stated as one-tenth of an inch to

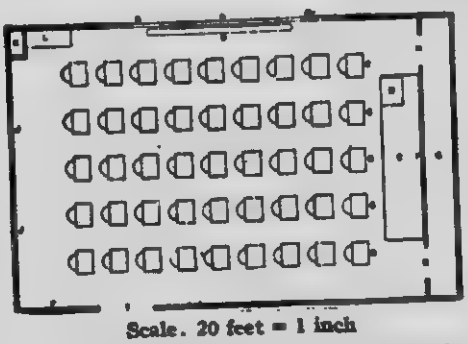


FIG. 106—The same Map on a smaller scale

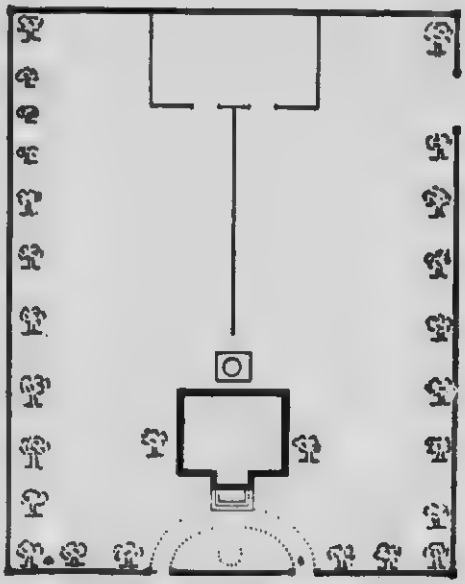


FIG. 107—Plan of a School-house and Grounds

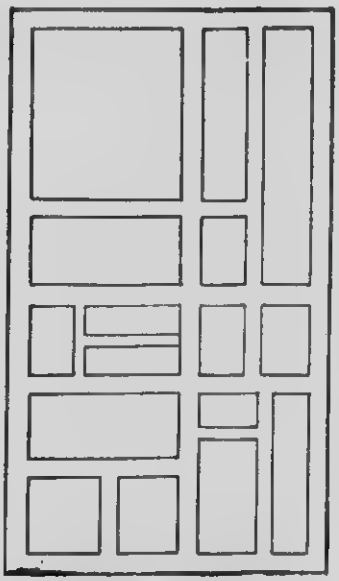


FIG. 108—Plan of a Section in the City

the foot. How long and how wide is the teacher's table; and the platform on which it stands? What are the dimensions of the desks used by the pupils? How wide are the aisles? How far is it from a wall to the row of desks nearest it? Use a scale of a quarter of an inch to the foot, and draw a plan of your school room. Make all the measurements carefully with your rule or your knotted cord.

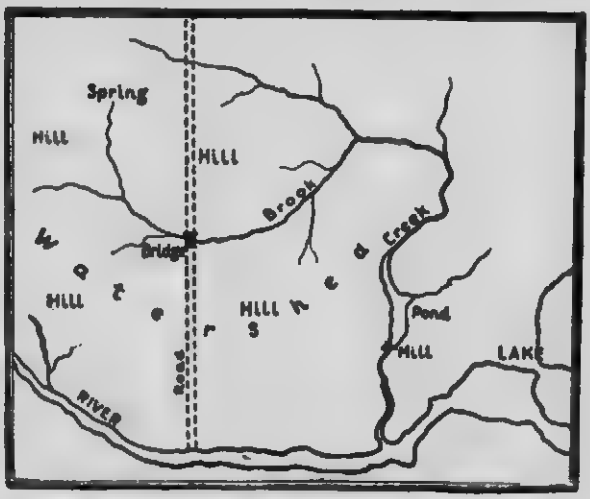


FIG. 109—Map of a Road in the Country, and its Neighborhood

Measure, by pac-

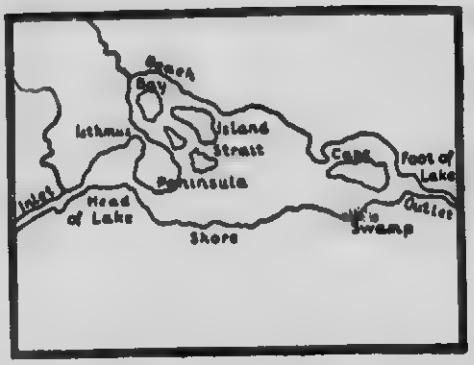


Fig. 110—Map of a Lake, Island, etc.

ing, your school grounds, and draw a plan of them, similar to the one shown in Fig. 107, selecting what you consider a suitable scale. Also, make a plan of the grounds around your home.

Plans of cities and large portions of country are called *maps*. These also must be drawn to a certain scale, but the scale must be much smaller than that used for rooms or buildings. In the map of part of a city, as shown in Fig. 108, the scale of one inch to about two hundred yards is used; and in the map of a country district (Fig. 109), the scale is one inch to about one mile. Sometimes so much country is shown on a map that a scale as small as one inch to one hundred, or even one thousand, miles is used. (Figs. 116 and 117).

Draw a map of your village or the part of your city around your home to a scale of two inches to a quarter of a mile. If you live in the country make a map of your neighborhood to a scale of two inches to a mile (Fig. 112). In both cases make your long measurements by pacing or by timing.

Examine closely these small maps (Figs. 109, 110, 111), and compare them with one another, and with the pictures and descriptions of the same places as given in the first chapter of this book.

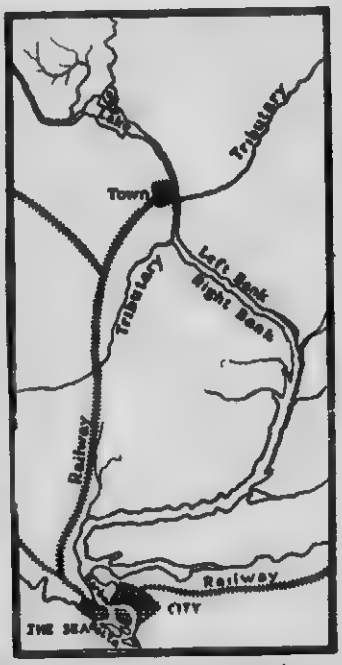


Fig. 111—Map of a River and its Neighborhood

OUR LAWS AND RULERS

In all our games—lacrosse, baseball, football, hockey, and the rest,—there are certain rules which must be observed in playing. If these rules be broken punishments are inflicted, and if disputes arise an umpire or referee is needed to settle them. In our homes and in our school, rules must be observed in order that work may be properly done; and our parents and our teachers aid us in following them.

As in our games, our homes, and our schools, so also in our country there must be rules for the people to observe, in order that they may be good citizens and the country be peaceful and prosperous. These rules are called *laws*. Some men are appointed to make the laws; and others to see that the laws are obeyed, law breakers punished, and disputes settled.

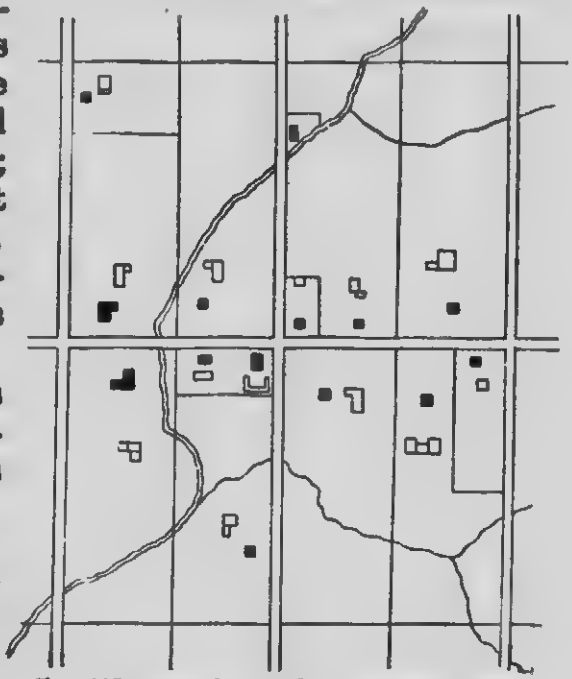


FIG. 112—Map of part of a Township. Note concession line and side lines

The settled parts of our country are divided into sections called *townships*, or, in some places *parishes*, each one being usually from ten to fifteen miles long and from five to ten

miles wide. In each township a *council* of from four to six men is elected once each year by vote of the people, to make laws and do business for the township, the head man of the council being known as the *reeve*. The council meets in the township hall, or as it is commonly called the *town hall*, at regular dates, to perform their duties. Here is the map of part of a township (Fig. 112).

The rows of farms are *concessions*; the roads between the concessions along which the greater number of residences are built are *concession lines*; and the roads along the sides of the farms are *side lines*.

When a village becomes large enough it is *incorporated*, that is, given the right to have its own reeve and council and to make its own local laws or regulations. As it increases in size it may become a *town*, and when still larger it may be made a *city*. The man at the head of a town or city council is called the *mayor*, and the members of a city council are called *aldermen*.

Several townships are grouped together to form a *county*

FIG. 113—Map of a County

(Fig. 113). Each county has its *county council*, which meets once or twice a year in the *county town*. The head man in the county council is called the *warden*. In what county do you live? What is your county town?

Any subdivision of the country for local government—township or parish, county, village, town, city,—is called a *municipality*.

On a suitable scale, say an inch to a mile, draw a map of the township in which you live, and mark in it concession lines, side lines, villages, towns, large streams, your home, your school, and the town hall.

Use a smaller scale, say an inch to eight or ten miles, and draw a map of your county. Name in it all the townships, villages, towns, cities, railways, rivers, and other important features.

You have, no doubt, often heard people speak of the British Empire. Across the Atlantic Ocean, near the west coast of Europe, there is a group of islands known as the British Isles. One of these islands is called Great Britain, and is made up of England, Scotland, and Wales; and another one is called Ireland. During the past four hundred years these islands have become a powerful nation, and have obtained possession of the whole of the continent of Australia, nearly one-third of the continent of Africa, the country in southern Asia called India, about one-half of the continent of North America (Canada), and many islands, cities, and small states in nearly all parts of the world. The British Isles and all these possessions, or, as most of them are called, *colonies*, make up the great British Empire, the largest and most powerful empire the world has ever seen.

At the head of this vast empire is our King, Edward the Seventh, eldest son of the late Queen Victoria. He was born Nov. 9th, 1841, and has been King since Jan.

22nd, 1901. He also carries the title of Emperor of India. His wife is Queen Alexandra, daughter of the King of Denmark (Denmark is one of the smaller countries of Europe). The King is very popular with all classes of his subjects, and the Queen has been beloved of every one during her residence of more than forty years in the British Isles. The only son of the King and Queen now living is George, Prince of Wales, who is to succeed to the throne at his father's death. The Prince has an interesting family of

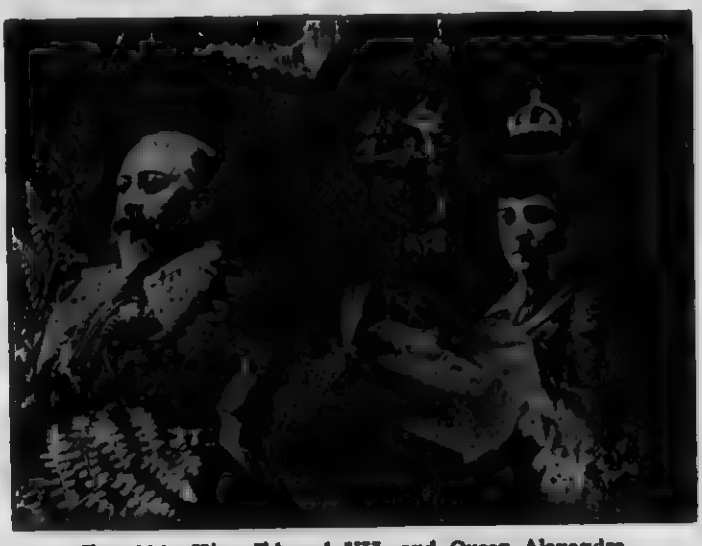


FIG. 114—King Edward VII, and Queen Alexandra

little folks, the eldest of whom is Prince Edward, who may some day be King of the British Dominions.

The people of the British Isles elect by vote a body of men, called the *House of Commons*, to make laws for them. Another council, composed of dukes, earls, bishops, and other *nobility*, assists in the work of law-making, and is called the *House of Lords*. The two Houses together constitute the British *Parliament*. Some of the leading statesmen of both Houses form a committee, called the *Cabinet* or *Ministry*, to assist and advise the King. The

leader of the Cabinet, who is chosen by the King, is known as the *Prime-Minister* or *Premier*, and he in turn selects the members of his Cabinet. Find out who is the present British Prime-Minister. The Parliament meets in the great city of London in England, and that city is therefore the *capital* of the Empire.

The government of the Dominion of Canada is managed by a Parliament which is very much like the one in Lon-

FIG. 115—Parliament Buildings in the City of Ottawa

don. It consists of a House of Commons, elected by the people, a Senate (corresponding to the British House of Lords), and a Cabinet. The King is represented by the Governor-General, who is appointed by the British Government for a period of five or six years. The Canadian Parliament meets in the city of Ottawa, and therefore Ottawa is the *capital* of Canada. The Parliament Buildings in that city are a group of handsome and costly stone structures on high ground on the banks of the river Ottawa

(Fig. 115). Rideau Hall, the residence of the Governor-General, is at Ottawa. Who is the present Governor-General of Canada? Who is the Canadian Prime-Minister?

Canada is divided into fourteen subdivisions. Nine of these in the well-settled parts are known as *Provinces;* four of them that are very sparsely populated are called *Districts;* and one in the region of the Klondike gold mines is a *Territory.* Each province has a regular system of government of its own, made up of Parliament, or *Legislature,* and Lieutenant-Governor (who is assisted by a Cabinet). The subdivisions of a Province are Counties, which have already been described. In what Province do you live? Who is your present Lieutenant-Governor? Who is your Provincial Premier? The names, locations, and capitals of all the subdivisions of Canada you will learn in the next chapter.

QUESTIONS

1. What different subdivisions are there in the Dominion of Canada, and how do they differ from one another?

2. What are the subdivisions of a Province? Of a County?

3. What names are given to the chief council of the Dominion, of a Province, of a County, and of a Township, and what are the chief officers in each called?

4. Where are the largest colonies in the British Empire?

(Map of the Dominion of Canada opposite)


DOMINION OF CANADA
AND NEWFOUNDLAND
SCALE OF MILES
0 100 200 300 400 500 600
Cities with over 200,000 population shown thus — Montreal
" " " 50,000 " " " — Winnipeg
Capitals are shown thus ⊕
ARCTIC
OCEAN
Beaufort Sea
KLONDIKE
Melville Sound
BANKS LAND
PRINCE ALBERT LAND
WOLLASTON LAND
PARRY ISLANDS
Great Bear Lake
Great Slave Lake
Fort Yukon
Pt. Churchill
Reindeer Lake
Lake Winnipeg
Prince Albert
Chesterfield Inlet
Missouri
Columbia
Portland
Duluth
Minneapolis
St. Paul
Helena
Longitude
West


NEWFOUNDLAND
SCALE OF MILES
0
50
100
GREENLAND
To Denmark
C. York
BAFFIN BAY
BAFFIN LAND
Davis Strait
Disko I.
Lancaster Strait
NORTH DEVON
Jones Sd.
GRINNELL LAND
NORTH LINCOLN
COCKBURN ISLAND
BOOTHIA FELIX
MELVILLE PENINSULA
Fox Channel
ARCTIC CIRCLE
FOX LAND
CUMBERLAND PEN.
Cumberland Sound
C. Mercy
HALL PEN.
Frobisher B.
Hudson Strait
RESOLUTION I.
C. Chidley
SOUTHAMPTON ISLAND
Chesterfield Inlet
Fisher Strait
MANSFIELD I.
Mosquito Bay
Payne L.
Ungava Bay
HUDSON BAY
C. Dufferin
Richmond Gulf
Great Whale R.
C. Henrietta Maria
LABRADOR
Hamilton Inlet
Height of Land
Strait of Belle Isle
C. Bauld
Belle Isle
Notre Dame B.
FOGO I.
Hamilton Sd.
White B.
Bonne B.
B. of Islands
St. George B.
Port au Basque
C. Ray
Exploits R.
Grand L.
Bonavista B.
Trinity B.
Placentia Bay
St. Mary's B.
C. Race
Banks of Newfoundland
GREAT MIQUELON I. (To Fr.)
LIT. MIQUELON I. (To Fr.)
ST. PIERRE (To Fr.)
Gulf of St. Lawrence
PRINCE EDWARD I.
NEW BRUNSWICK
NOVA SCOTIA
Halifax
C. Sable
SABLE I.
Cabot Channel
Portland
Boston
C. Cod
New York
Buffalo
Detroit
Chicago
Milwaukee
St. Paul
Duluth
Lake Superior
Lake Michigan
Toronto
OTTAWA
Port Arthur
ONTARIO
QUEBEC
L. Mistassini
Three Rivers
ATLANTIC OCEAN
CANADA
UNITED STATES
West from Greenwich
100
90
80
70
60
50
40

DOMINION AND PROVINCIAL MAPS

Let us study for a little while the Map of the Dominion of Canada. (See large colored map.)

We must first learn how to determine directions on a map. Do you notice the fine lines which cross the map both up and down and from left to right,—those up and down being closer together at the top of the map than at the bottom, the others curved and the same distance apart for their whole length? Examine your school globe and see if you can find similar lines on it. Those drawn up and down run directly toward the north and south poles, and therefore show the directions north and south. The curved ones go east toward the right and west toward the

FIG. 116—Outline Map of the Dominion of Canada. The scale here used is one inch to about one thousand miles

left. Is north always in the same direction on a map? Can you find a place on one part of the map where the direction east seems almost the same as north on another part? Account for this.

What ocean is north of Canada? What ocean is south-east? What ocean is west? What country is south? What large bay is near the centre, and with what ocean is it connected? What group of large lakes is south of this bay? What river drains these lakes? In what direction does it flow? What great mountain system is in the western part of Canada?

Find on the map the nine Provinces, the names of which, in order from west to east, are: British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Quebec, New Brunswick, Nova Scotia, and Prince Edward Island. Name and describe the situation of the capital of each.

Find on the map the Territory of Yukon in the far north-west corner of Canada. What is its capital, and on what river is it built?

The remaining subdivisions of Canada are the Districts. Name all of them (four in number).

The island of Newfoundland, east of Canada, is British, but is not a part of the Dominion of Canada. The Labrador coast, along the eastern border of the District of Ungava and the Province of Quebec, belongs to Newfoundland.

Practise drawing the outline map of Canada (Fig. 116), until you can make a good copy in not more than five minutes. Afterwards make a map of Canada in which you will name the boundary waters and countries, the Great Lakes, the six largest rivers, the Rocky Mountains, and the various subdivisions and their capitals.

Study the map of your Province, and find in it the county in which you live, and the large towns and cities near your home. Find your Province on the map of the

FIG. 117—Outline Map of Ontario. This scale is one inch to about two hundred miles

Dominion, and name its boundaries as they appear on that map.

Practise drawing the outline map of your Province until you can make a correct and neat copy in not more than five minutes, similar to Fig. 117. Then carefully draw the map and mark and name on it the boundaries, large mountains (if any), rivers, lakes, the capital, your county, and any large towns and cities.

(Map of North America follows)


NORTH AMERICA
SCALE OF MILES
0
500
1000
Longitude
West from Greenwich
ARCTIC OCEAN
GREENLAND
DOMINION OF CANADA
HUDSON BAY
BAFFIN LAND
Baffin Bay
Davis Strait
LABRADOR
NEWFOUNDLAND
NOVA SCOTIA
Ottawa
Montreal
Quebec
Boston
New York
Philadelphia
WASHINGTON
Chicago
St. Louis
Minneapolis
San Francisco
Los Angeles
New Orleans
GULF OF MEXICO
TROPIC OF CANCER
C. San Lucas
C. Hatteras
BERMUDA IS.
BAHAMA ISLANDS
HAVANA
CUBA
HAITI
JAMAICA
PORTO RICO
ANTILLES
CARIBBEAN SEA
Acapulco
Vera Cruz
CENTRAL AMERICA
SOUTH AMERICA
PACIFIC OCEAN
ATLANTIC OCEAN